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Pope-Reid Associates, Inc., St. Paul, MN

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FINAL REPORT

GUIDANCE MANUAL: COST ESTIMATES FOR CLOSURE AND POST-CLOSURE PLANS (SUBPARTS G AND H)

VOLUME III - UNIT COSTS

Prepared for:

U. S. Environmental Protection Agency
Washington, D. C.

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This volume consists of information and guidance on typical unit costs unit costs unit cost ranges, and how the unit costs are applied in various facility situations. This volume's purpose is to provide guidance in completing the worksheets in Volume I and II (Treatment and Storage Facilities and Land Disposal Facilities, respectively).

Before using this volume, the appropriate closure and post-closure worksheets (from Volume I and/or II) should be selected in this way, the user can determine the applicable closure and psot-closure actions which require cost estimates. Cost estimating consists of identifying the tasks to be performed, selecting the labor and equipment necessary to complete each task, and using a cost reference to choose a unit cost for each of the components of the tasks. In the cases where the user is having difficulty developing cost estimates, cross references to this volume are included on the worksheets in Volume I and II.

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CHAPTER 1

INTRODUCTION

Subpart H of Part 264 and Part 265 of the RCRA Subtitle C regulations requires that owners/operators of all hazardous waste treatment and storage facilities prepare an estimate of the cost for closing the facility in accordance with the RCRA regulations. Treatment and storage facilities typically are not subject to post-closure care, consequently, post-closure cost estimates are not required. However, tank facilities failing to comply with the Part 264 and 265 tank secondary containment requirements must prepare a contingent closure cost estimate and subsequently a contingent post-closure cost estimate. Financial assurance must be established for closure and post-closure (contingent tanks), the amount of which is based on these cost estimates. Reviewers of closure and post-closure cost estimates need to be able to determine whether the cost estimates are reasonable in order to assess the adequacy of the closure and post-closure financial assurance. This involves consideration both of the closure and post-closure plans and of the unit costs and calculations used to develop the cost estimates.

This is Volume I of the Guidance Manual: Cost Estimates for Closure and Post-Closure Plans (Subparts G and H). The purpose of this volume is to provide a framework for developing the closure cost estimate for treatment and storage technologies. It is intended for use both by TSDF owners/operators who prepare closure and post-closure cost estimates and by state and EPA Regional personnel who are responsible for reviewing the cost estimates. This volume contains the worksheets for estimating closure costs for container storage, treatment and storage tanks, and incineration. In addition, it includes summary worksheets for totalling facility costs. If a contingent closure cost estimate is required for a tank facility, a contingent post-closure cost estimate is also required. For developing tank post-closure cost estimates the user should refer to the post-closure worksheets in Chapter 6 of Volume II. Otherwise, post-closure care

and contingent cost estimates are not required for the technologies addressed in Volume I.

Following this introduction, Volume I is divided into four chapters. The first contains closure cost estimating worksheets for container storage facilities. The second contains treatment/storage tank closure worksheets, and the third chapter contains worksheets for incinerator closure. The final chapter of this volume contains the summary worksheets; it is identical to the summary chapter in Volume II - Land Disposal Facilities.

Within each chapter, the worksheets are grouped by letter to indicate technology and by number to indicate individual worksheets. For example, the Inventory Management worksheet for container storage is Worksheet A-1; the Air Quality Monitoring worksheet for incineration is Worksheet C-2. All worksheets can be used for estimating both Part 264 and Part 265 closure costs.

The worksheet blanks to be filled in are arranged in two columns. All facility data, unit costs, and intermediate calculations are placed in the left column. Results of all subtotal calculations are placed in the right column. The final line item in each worksheet is a subtotal that is entered in a box. This is the sum of all costs in the right column.

For the user's assistance, typical unit costs and a page number reference are provided in parenthesis to the left of the worksheet blanks. In some cases, a typical cost is not shown but a page number(s) is referenced. The page number reference refers to Volume III - Unit Costs. Volume III contains information and guidance on unit cost ranges, typical unit costs, and how the unit costs are applied in various facility situations. If the user needs guidance for any closure or post-closure items, the user should refer to the referenced pages in Volume III.

The worksheets were designed to be as complete and detailed as possible, so some of the worksheet items/sections may not be applicable to particular facility situations. The user should ignore such sections and feel free to adjust

the worksheet formats as necessary to maximize their usefulness. The worksheets are not intended to be used for assessing the adequacy of the closure plan itself or for determining which regulations apply to the facility being evaluated. The user of this document should already have developed or reviewed the content of the closure plans and have determined that they are adequate before using the worksheets to prepare or assess the cost estimates. To assess the adequacy of the closure plan the user should consult guidance documents such as permit writers' guidance manuals and technical resource documents on specific subjects. Two examples of such documents are Closure of Hazardous Waste Surface Impoundments (SW-873) and Evaluating Cover Systems for Solid and Hazardous Waste (SW-867). EPA has prepared a closure/post-closure plan guidance document that is a companion to this document. It is entitled "Draft RCRA Guidance Manual for Subpart G Closure and Post-Closure Care Standards and Subpart H Cost Estimating Procedures," and it could be used as a guide for evaluating the plans themselves.

The worksheets are arranged by type of TSDF so that all of the relevant worksheets are included for each type of waste management unit or technology. However, an owner/operator may plan on closing more than one type of unit or technology at a given time (e.g., closing an incinerator and waste storage tanks). Some activities, such as certification, would be done once for both units. In such multiple-technology situations, the user should take care to ensure that all relevant closure activities are addressed but are not double-counted.

CHAPTER 2

CONTAINER STORAGE

This chapter contains the worksheets for estimating Part 264 or Part 265 closure costs for container storage facilities. Applicable sections of Worksheets A-1, A-2, and A-3 should be completed for all container storage facilities. Worksheet A-4 will be applicable if all contaminated areas associated with container storage cannot be successfully decontaminated, and Worksheet A-5 will be applicable if there is contaminated soil at the facility. Worksheet A-6 will be applicable only if closure of the container storage area results in final closure of the entire TSDF. The container storage worksheets address the following items:

- Inventory Management
  1. Recontainerization of waste
  2. Inventory quantity (maximum)
  3. Container loading
  4. Off-site management of inventory (includes containers and waste)
  5. Solidification prior to on-site landfill disposal
  6. On-site disposal
- Testing for Soil Contamination
  1. Background samples and samples with potential contamination
  2. Preparation of isogram plan
- Decontamination
  1. Protective clothing and safety equipment for facility personnel
  2. Equipment decontamination
  3. Pad or foundation decontamination

4. Sump decontamination
5. Container rinsing
6. Other items needing decontamination
7. On-site treatment of decontamination residues
8. Testing for success of decontamination
9. Treated residue discharge to sewer
10. Off-site management of decontamination fluid/residues and/or treatment residue
11. Off-site management of rinsed containers in a sanitary landfill
12. On-site disposal

- Foundation/Pad Removal

1. Protective clothing
2. Pad or foundation demolition
3. Equipment decontamination
4. On-site treatment of decontamination residues
5. Treated residue discharge to sewer
6. Off-site management of rubble, decontamination residue, and/or treatment residue
7. On-site disposal

- Removal of Contaminated Soil

1. Protective clothing
2. Excavation of contaminated soil and earther berms
3. Equipment decontamination
4. On-site treatment of decontamination residues
5. Treated residue discharge to sewer
6. Off-site management of contaminated soil, decontamination residue, and/or treatment residue
7. On-site disposal

- Certification of Final Closure

1. Independent registered professional engineer
2. Clerical

WORKSHEET A-1

Inventory Management

1. Recontainerization of Waste

   a. Number of damaged/leaking containers needing recontainerization _____

   b. Recontainerization unit cost ($/container) _____ ($144/container; p. 4-8)

   c. Recontainerization cost ($) Line 1a x Line 1b _____

2. Inventory Quantity (Maximum)

   a. Total number of full containers _____

   b. Container capacity (gal/container) _____

   c. Containerized waste quantity (gal) Line 2a x Line 2b _____

   d. Total number of empty containers _____

   e. Container weight (lb/container) _____ (55 lb/container; p. 4-8)

   f. Total container weight (tons) Line 2c + (Line 2d x Line 2e) _____*

3. Container Loading

   a. Number of pallets (Line 2a ÷ Line 2d) ÷ 4 (round up to nearest integer) _____

   b. Loading unit cost ($/pallet) _____ ($4.66/pallet; p. 4-8)

   c. Container loading cost ($) Line 3a x Line 3b _____

* Conversion factors are provided in the Volume III appendix.

WORKSHEET A-1 (page 2)

4. Off-Site Management of Inventory
(include containers and waste)

a. Quantity to be managed off-site (tons) _____*

b. Truck capacity (tons) _____

c. Number of loads
Line 4a ÷ Line 4b _____

d. One-way distance (mi/load) _____

e. Transportation unit cost ($/mi) _____($4.50/mi; p. 4-15)*

f. Transportation cost ($)
Line 4c x Line 4d x Line 4e _____

g. Off-site management unit cost ($/ton) _____(pp. 4-13 - 4-20)

h. Off-site management cost ($)
Line 4a x Line 4g _____

i. Off-site management subtotal ($)
Line 4f + Line 4h _____

5. Solidification Prior to On-Site Landfill Disposal

a. Number of containers to be solidified (containers) _____

b. Solidification unit cost ($/container) _____($10.50/container; p. 4-9)

c. Solidification cost ($)
Line 5a x Line 5b _____

6. On-Site Disposal

Include volume on one or more worksheets:
Landfill Inventory - Line 1h
Incinerator Inventory - Line 1d
Land Treatment Inventory - Line 1e

7. Container and Drum Inventory Management Subtotal ($)
Line 1c + Line 3c + Line 4i + Line 5c

---

* Conversion factors are provided in the Volume III appendix.
* Based on a 250-mile one-way distance.

WORKSHEET 4-2

Testing for Soil Contamination

1. Background Samples and Samples with Potential Contamination

   a. Number of soil samples to be taken _____

   b. Number of samples requiring coring through concrete/asphalt foundations/pads _____

   c. Thickness of foundation/pad (inches) _____

   d. Unit cost for coring through/removing concrete/asphalt foundations/pads ($/sample) _____ ($15/inch; p. 6-1)

   e. Sample collection time required (hrs/sample) _____ (1 hr/sample; p. 2-12)

   f. Transportation time to and from site (hrs) _____

   g. Contract lab technician unit labor cost ($/hr) _____ ($20.50/hr; p. 9-3)

   h. Sample collection time (hrs) (Line 1a x Line 1e) + Line 1f _____

   i. Sampling cost ($)
   (Line 1b x Line 1c x Line 1d)
   (Line 1g x Line 1h) _____ _____ (p. 2-13)

   j. Contract lab fee ($/sample) _____

   k. Contract lab cost ($)
   Line 1a x Line 1j _____

   l. Sample cost ($)
   Line 1i + Line 1k _____

2. Preparation of Isogram Plan

   a. Engineer time required (hrs) _____

   b. Engineer unit labor cost ($/hr) _____ ($45.50/hr; p. 9-3)

   c. Engineer cost ($)
   Line 2a x Line 2b _____

   d. Draftsperson time required (hrs) _____

   e. Draftsperson unit labor cost ($/hr) _____ ($24/hr; p. 9-3)

WORKSHEET A-2 (page 2)

f. Draftsperson cost ($)
Line 2d x Line 2e _____

g. Clerical time required (hrs) _____

h. Clerical unit labor cost ($/hr) _____ ($18/hr; p. 9-3)

i. Clerical cost ($)
Line 2g x Line 2h _____

j. Isogram plan cost ($)
Line 2c + Line 2f + Line 2i _____

3. Soil Testing Subtotal ($)
Line 1l + Line 2j _____

WORKSHEET A-3

Decontamination

1. Protective Clothing and Safety Equipment for Facility Personnel

   a. Number of personnel requiring protective clothing and safety equipment for decontamination _____

   b. Safety equipment and protective clothing unit cost ($/person) _____ ($80/person; p. 5-6)

   c. Safety equipment and protective clothing cost ($)
   Line 1a x Line 1b _____

2. Equipment Decontamination

   a. Equipment needing decontamination:

   - pumps and feed lines
   - heavy equipment (e.g., fork lifts, dozers, etc.)
   - other equipment (list)_____

   _____

   b. Number of pumps and lines _____

   c. Pumps and lines decontamination cost ($) _____(p. 5-4)

   d. Residual generation rate for pump and line decontamination _____(50 gal/pump and line; p. 5-1)

   e. Residual generated from pump and line decontamination (gal)
   Line 2b x Line 2d _____

   f. Heavy equipment decontamination cost ($) _____(p. 5-2)

   g. Total heavy equipment decontamination time (hrs) _____(p. 5-2)

   h. Residual generation rate for heavy equipment decontamination (gal/hr) _____(100 gal/hr; p. 5-1)

WORKSHEET A-3 (page 2)

i. Residual generated from heavy equipment decontamination (gal)
Line 2g x Line 2h _____

j. Equipment decontamination cost ($)
Line 2c + Line 2f _____

k. Contaminated fluid and/or residues generated (gal)
Line 2e + Line 2i _____

3. Pad or Foundation Decontamination

a. Method of pad decontamination _____

b. Pad area to be decontaminated (ft^2) _____

c. Pad decontamination unit cost ($/$ft^2$) _____ (p. 5-3)

d. Pad decontamination subtotal ($)
Line 3b x Line 3c _____

e. Residual generation rate for pad/foundation decontamination (gal/ft^2) _____ (p. 5-3)

f. Contaminated fluid and/or residues generated (gal)
Line 3b x Line 3e _____

4. Sump Decontamination

a. Method of sump decontamination _____

b. Volume to be pumped from sump(s) (gal) _____

c. Time required for pumping (hrs)
Line 4b ÷ 8000
(round up to nearest integer) _____

d. Pumping unit cost ($/hr) _____ ($23/hr; p. 4-11)

e. Pump rental cost, optional ($/hr) _____ ($2.70/hr; p. 4-11)

f. Pumping cost ($)
(Line 4c x Line 4d) + Line 4e _____

WORKSHEET A-3 (page 3)

g. Sump area to be decontaminated (ft^2) _____

h. Sump decontamination unit cost ($/$ft^2$) _____ (p. 5-3)

i. Sump decontamination cost ($)
Line 4g x Line 4h _____

j. Sump decontamination subtotal ($)
Line 4f + Line 4i _____

k. Residual generation rate for sump decontamination (gal/ft^2) _____ (p. 5-3)

l. Contaminated fluid and/or residues generated (gal)
Line 4b + (Line 4g x Line 4k) _____

5. Container Rinsing

a. Number of containers _____

b. Container rinsing time required (hrs)
0.083 x Line 5a _____

c. Container rinsing unit cost ($/hr) _____ ($32.75/hr; p. 5-10)

d. Container rinsing subtotal ($)
Line 5b x Line 5c _____

e. Residual generation rate for container rinsing (gal/drum) _____ (10 gal/drum; p. 5-10)

f. Contaminated fluid/residual generated (gal)
Line 5a x Line 5e _____

6. Other Items Needing Decontamination

a. List items _____

_____

b. Method of decontamination for other items _____

WORKSHEET A-3 (page 4)

c. Surface area of other items to be decontaminated (ft^2) _____

d. Decontamination unit cost ($/$ft^2$) _____ (p. 5-3)

e. Decontamination of other items subtotal ($)
Line 6c x Line 6d _____

f. Residual generation rate for decontamination of other items (gal/ft^2) _____ (p. 5-3)

g. Contaminated fluid and/or residues generated (gal)
Line 6c x Line 6f _____

7. On-Site Treatment of Decontamination Residues

a. Quantity of residue to be treated (gal) _____

b. Chemicals required for treatment (lb/gal residue or gal/gal residue) _____ (pp. 4-12 - 4-13)

c. Chemicals unit cost ($/lb or $/gal) _____

d. Chemicals cost ($)
Line 7a x Line 7b x Line 7c _____

e. Electricity required for treatment (kwh/gal residue) _____ (pp. 4-12 - 4-13)

f. Electricity unit cost ($/kwh) _____ ($0.05/kwh; p. 4-2)

g. Electricity cost ($)
Line 7a x Line 7e x Line 7f _____

h. Water required for treatment (gal/gal residue) _____ (pp. 4-12 - 4-13)

i. Water unit cost ($/1000 gal) _____ ($1.22/1000 gal; p. 4-2)

j. Water cost ($)
[(Line 7a x Line 7h) ÷ 1000] x Line 7i _____

k. Fuel required for treatment (MMBtu/gal residue) _____ (pp. 4-12 - 4-13)

WORKSHEET A-3 (page 5)

l. Fuel unit cost ($/MMBtu) _____ (p. 4-2)

m. Fuel cost ($)
Line 7a x Line 7k x Line 7l _____

n. Labor required for treatment
(hrs/gallon residue) _____ (pp. 4-12 - 4-13)

o. Process operator unit labor cost
($/hr) _____ ($26.50/hr; p. 9-3)

p. Labor cost ($)
Line 7a x Line 7n x Line 7o _____

q. On-site treatment cost ($)
Line 7d + Line 7g + Line 7j +
Line 7m + Line 7p _____

r. Residue generated from treatment
(gal) _____

8. Testing for Success of Decontamination

a. Number of Samples _____

b. Sample collection time required
(hrs/sample) _____

c. Technician unit labor cost ($/hr) _____ ($20.50/hr; p. 9-3)

d. Sample collection time (hrs)
Line 8a x Line 8b _____

e. Sampling cost ($)
Line 8c x Line 8d _____

f. Cost to test each sample ($/sample) _____ (pp. 5-10 - 5-11)

g. Testing cost ($)
Line 8a x Line 8f _____

h. Testing for success of
decontamination cost ($)
Line 8e + Line 8g _____

9. Treated Residue Discharge to Sewer

a. Volume of liquid discharged (gal) _____

b. Sewer discharge unit cost
($/1000 gal) _____ ($1.50/1000 gal;
p. 4-2)

WORKSHEET A-3 (page 6)

c. Sewer discharge cost ($)
(Line 9a ÷ 1000) x Line 9b _____

10. Off-Site Management of Decontamination Fluid/Residues and/or Treatment Residue

a. Off-site management method _____

b. Quantity to be managed off-site (tons) _____*

c. Truck capacity (tons) _____

d. Number of loads
Line 10b ÷ Line 10c
(round up to nearest integer) _____

e. One-way distance (mi/load) _____

f. Transportation unit cost ($/mi) _____ ($4.50/mi; p. 4-15)**

g. Transportation cost ($)
Line 10d x Line 10e x Line 10f _____

h. Off-site management unit cost ($/ton) _____ (pp. 4-13 - 4-20)

i. Off-site management cost ($)
Line 10b x Line 10h _____

j. Contaminated fluid and residue disposal subtotal ($)
Line 10g + Line 10i _____

11. Off-Site Management of Rinsed Containers in a Sanitary Landfill

a. Quantity to be managed off-site (tons) _____ (55 lbs/container; p. 4-8)

b. Truck capacity (tons) _____

c. Number of loads
11a ÷ 11b
(round up to nearest integer) _____

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* Conversion factors are provided in the Volume III appendix.
** Based on a 250-mile one-way distance.

WORKSHEET A-3 (page 7)

d. One-way distance (mi/load) _____

e. Transportation unit cost ($/mi) _____ ($5.19/mi; p. 4-15)***

f. Transportation cost ($)
Line 11c x Line 11d x Line 11e _____

g. Sanitary landfill disposal cost ($/ton) _____ ($12/ton; p. 5-10)

h. Off-site management cost ($)
Line 11a x Line 11g _____

i. Empty container disposal Subtotal ($)
Line 11n + Line 11e _____

12. On-Site Disposal

Include volume on one or more worksheets:
Landfill Inventory - Line 1n, Line 1p
Incinerator Inventory - Line 1l, Line 1n
Land Treatment Inventory - Line 1k, Line 1o

13. Facility Decontamination Subtotal ($)
Line 1c + Line 2j + Line 3d + Line 4j +
Line 5c + Line 6e + Line 7c + Line 8n +
Line 9c + Line 10j + Line 11i _____

*** Based on a 25-mile one-way distance.

WORKSHEET A-4

Foundation/Pad Removal

1. Protective Clothing

   a. Number of personnel requiring protective clothing for demolition _____

   b. Protective clothing unit cost ($/person) _____ ($77/person; p. 6-8)

   c. Protective clothing cost ($)
   Line 1a x Line 1b _____

2. Pad or Foundation Demolition

   a. Volume of pad/foundation to be demolished (yd^3) _____

   b. Demoliton unit cost ($/$yd^3$) _____ ($82/yd^3; p. 6-1)

   c. Pad/foundation loading unit cost ($/$yd^3$) _____ (p. 4-7)

   d. Demolition and loading cost ($)
   Line 2a x (Line 2b + Line 2c) _____

   e. Mobilization/demolition cost ($) _____ (p. 4-7)

   f. Pad/foundation demolition and loading cost before surcharge ($)
   Line 2d + Line 2e _____

   g. Surcharge factor _____ (1.0; pp. 6-8 - 6-9)

   h. Foundation demolition cost ($)
   Line 2f x (1 + Line 2g) _____

3. Equipment Decontamination

   a. Total heavy equipment decontamination time (hrs) _____ (p. 5-2)

   b. Heavy equipment decontamination cost ($) _____ (p. 5-2)

   c. Residual generation rate for heavy equipment decontamination (gal/hr) _____ (100 gal/hr; p. 5-1)

   d. Contaminated fluid and/or residue generated (gal)
   Line 3a x Line 3c _____

WORKSHEET A-4 (page 2)

4. On-Site Treatment of Decontamination Residues

a. Quantity of residue to be treated (gal) _____

b. Chemicals required for treatment (lb/gal residue or gal/gal residue) _____ (pp. 4-12 - 4-13)

c. Chemicals unit cost ($/lb or $/gal) _____

d. Chemicals cost ($)
Line 4a x Line 4b x Line 4c _____

e. Electricity required for treatment (kwn/gal residue) _____ (pp. 4-12 - 4-13)

f. Electricity unit cost ($/kwn) _____ ($0.05/kwh; p. 4-2)

g. Electricity cost ($)
Line 4a x Line 4e x Line 4f _____

h. Water required for treatment (gal/gal residue) _____ (pp. 4-12 - 4-13)

i. Water unit cost ($/1000 gal) _____ ($1.22/1000 gal; p. 4-2)

j. Water cost ($)
[(Line 4a x Line 4h) ÷ 1000]
x Line 4i _____

k. Fuel required for treatment (MMBtu/gal residue) _____ (pp. 4-12 - 4-13)

l. Fuel unit cost ($/MMBtu) _____ (p. 4-2)

m. Fuel cost ($)
Line 4a x Line 4k x Line 4l _____

n. Labor required for treatment (hrs/gallon residue) _____ (pp. 4-12 - 4-13)

o. Process operator unit labor cost ($/hr) _____ ($26.50/hr; p. 9-3)

p. Labor cost ($)
Line 4a x Line 4n x Line 4o _____

q. On-site treatment cost ($)
Line 4d + Line 4g + Line 4j +
Line 4m + Line 4p _____

r. Residue generated from treatment (gal) _____

WORKSHEET A-4 (page 3)

5. Treated Residue Discharge to Sewer

   a. Volume of liquid discharged (gal) _____

   b. Sewer discharge unit cost ($/1000 gal) _____ ($1.50/1000 gal; p. 4-2)

   c. Sewer discharge cost ($)
   (Line 5a ÷ 1000) x Line 5b _____

6. Off-Site Management of Rubble, Decontamination Residue, and/or Treatment Residue

   a. Volume to be managed off-site (tons) _____*

   b. Truck capacity (tons) _____

   c. Number of loads
   Line 6a ÷ Line 6b
   (round up to nearest integer) _____

   d. Transportation unit cost ($/mi) _____ ($4.50/mi; p. 4-15)**

   e. One-way distance (mi/load) _____

   f. Transportation cost ($)
   Line 6c x Line 6d x Line 6e _____

   g. Off-site management unit cost ($/ton) _____ (pp. 4-13 - 4-20)

   h. Off-site management cost ($)
   Line 6a x Line 6g _____

   i. Off-site management subtotal ($)
   Line 6f + Line 6i _____

7. On-Site Disposal

   Include volume on one or more worksheets:
   Landfill Inventory - Line 1m, Line 1n, Line 1p
   Incinerator Inventory - Line 1l, Line 1n
   Land Treatment Inventory - Line 1k, Line 1o

8. Demolition and Removal Subtotal ($)
   Line 1c + Line 2h + Line 3b + Line 4q +
   Line 5c + Line 6i | |

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* Conversion factors are provided in the Volume III appendix.
** Based on a 250-mile one-way distance.

WORKSHEET A-5

Removal of Contaminated Soil

1. Protective Clothing

   a. Number of personnel requiring protective clothing for excavation and decontaminating _____

   b. Protective clothing unit cost ($/person) _____ ($77/person; p. 6-8)

   c. Protective clothing cost ($)
   Line 1a x Line 1b _____

2. Excavation of Contaminated Soil and Earthen Berms

   a. Volume of contaminated soil/berms to be removed (yd^3) _____

   b. Excavation unit cost, including loading ($/$yd^3$) _____ (pp. 6-3 - 6-7)

   c. Mobilization/demobilization cost ($) _____ (pp. 4-5, 4-7, 4-10, and 6-3)

   d. Contaminated soil/berm removal cost before surcharge ($)
   (Line 2a x Line 2b) + Line 2c _____

   e. Surcharge factor _____ (1.0; pp. 6-8 - 6-9)

   f. Contaminated soil/berm removal subtotal ($)
   Line 2d x (1 + Line 2e) _____

3. Equipment Decontamination

   a. Total heavy equipment decontamination time (hrs) _____ (p. 5-2)

   b. Heavy equipment decontamination cost ($) _____ (p. 5-2)

   c. Residual generation rate for heavy equipment decontamination (gal/hr) _____ (100 gal/hr; p. 5-1)

   d. Contaminated fluid and/or residues generated (gal)
   Line 3a x Line 3c _____

WORKSHEET 4-5 (page 2)

4. On-Site Treatment of Decontamination Residues

a.	Quantity of residue to be treated (gal)	_____
b.	Chemicals required for treatment (lb/gal residue or gal/gal residue)	_____ (pp. 4-12 - 4-13)
c.	Chemicals unit cost ($/lb or $/gal)	_____
d.	Chemicals cost ($) Line 4a x Line 4b x Line 4c	_____
e.	Electricity required for treatment (kwh/gal residue)	_____ (pp. 4-12 - 4-13)
f.	Electricity unit cost ($/kwh)	_____ ($0.05/kwh; p. 4-2)
g.	Electricity cost ($) Line 4a x Line 4e x Line 4f	_____
h.	Water required for treatment (gal/gal residue)	_____ (pp. 4-12 - 4-13)
i.	Water unit cost ($/1000 gal)	_____ ($1.22/1000 gal; p. 4-2)
j.	Water cost ($) [(Line 4a x Line 4h) ÷ 1000] x Line 4i	_____
k.	Fuel required for treatment (MMBtu/gal residue)	_____ (pp. 4-12 - 4-13)
l.	Fuel unit cost ($/MMBtu)	_____ (p. 4-2)
m.	Fuel cost ($) Line 4a x Line 4k x Line 4l	_____
n.	Labor required for treatment (hrs/gallon residue)	_____ (pp. 4-12 - 4-13)
o.	Process operator unit labor cost ($/hr)	_____ ($26.50/hr; p. 9-3)
p.	Labor cost ($) Line 4a x Line 4n x Line 4o	_____

WORKSHEET A-5 (page 3)

q. On-site treatment cost ($)
Line 4d + Line 4g + Line 4j + Line 4m + Line 4p _____

r. Residue generated from treatment (gal) _____

5. Treated Residue Discharge to Sewer

a. Volume of liquid discharged (gal) _____

b. Sewer discharge unit cost ($/1000 gal) _____ ($1.50/1000 gal; p. 4-2)

c. Sewer discharge cost ($)
(Line 5a ÷ 1000) x Line 5b _____

6. Off-Site Management of Contaminated Soil, Decontamination Residue, and/or Treatment Residue

a. Quantity to be managed off-site (tons) _____*

b. Truck capacity (tons) _____

c. Number of loads
Line 6a ÷ Line 6b
(round up to nearest integer) _____

d. One-way distance (mi/load) _____

e. Transportation unit cost ($/mi) _____ ($4.50/mi; p. 4-15)**

f. Transportation cost ($)
Line 6c x Line 6d x Line 6e _____

g. Off-site management unit cost ($/ton) _____ (pp. 4-13 - 4-20)

h. Off-site management cost ($)
Line 6a x Line 6g _____

i. Off-site management subtotal ($)
Line 6f + Line 6h _____

* Conversion factors are provided in the Volume III appendix.
** Based on a 250-mile one-way distance.

WORKSHEET 4-5 (page 4)

7. On-Site Disposal

Include volume on one or more worksheets:
Landfill Inventory - Line 1n, Line 1o, Line 1p
Incinerator Inventory - Line 1l, Line 1n, Line 1o
Land Treatment Inventory - Line 1k, Line 1l, Line 1o

8. Contaminated Soil Removal Subtotal ($)
Line 1c + Line 2f + Line 3b + Line 4q +
Line 5c + Line 6i

WORKSHEET A-6

Certification of Final Closure

1. Independent Registered Professional Engineer

   a. Initial review of closure plan (hrs) _____ (8 hrs; p. 8-4)

   b. Inspection frequency (inspections/wk) _____ (p. 8-3)

   c. Inspection time required (hrs/inspection) _____ (p. 8-3)

   d. Number of weeks for closure (wks) _____

   e. Inspection time required (hrs) Line 1b x Line 1c x Line 1d _____

   f. Prepare final documentation (hrs) _____ (4 hrs; p. 8-4)

   g. Total professional engineer time required (hrs) Line 1a + Line 1e + Line 1f _____

   h. Professional engineer unit labor cost ($/hr) _____ ($45.50/hr; p. 8-3)

   i. Professional engineer cost ($) Line 1g x Line 1h _____

2. Clerical*

   a. Clerical time required (hrs/wk) _____ (2 hrs/wk; p. 8-3)

   b. Clerical unit labor cost ($/hr) _____ ($18/hr; p. 8-3)

   c. Clerical cost ($) Line 1d x Line 2a x Line 2b _____

3. Certification of Closure Subtotal ($) Line 1i + Line 2c _____

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* Clerical time should be included only if the Professional Engineer is operating independently in a single-person business.

CHAPTER 3

TREATMENT AND STORAGE TANKS

This chapter contains the worksheets for estimating Part 264 or Part 265 closure costs and Part 264 or Part 265 contingent closure costs for onground (aboveground), inground, and underground tanks. Refer to Figures 1-13 of the preamble of the proposed tank rules in the Federal Register, Vol. 50, No. 123, June 26, 1985, pp. 26465-26481 for typical examples of these three types of tanks. Applicable sections of Worksheets B-1, B-2, and B-3 should be completed for all tanks used to treat or store hazardous wastes. Worksheet B-4 should be completed if there is a contaminated foundation or pad to be removed, or if necessary to remove the secondary containment system. Worksheets B-5 and B-6 would be applicable if the secondary containment is to be removed, or for onground tanks if a landfill cover is to be applied. Worksheet B-7 will be applicable if there is contaminated soil at the facility. Worksheet B-8 will be applicable only if closure of the tank(s) results in final closure of the entire TSDF.

Under the Part 264 and Part 265 regulations, a contingent closure cost estimate must be prepared if the tank system does not have secondary containment that meets the requirements of either 264.193 or 265.193, and is not exempt from the secondary containment requirements. The contingency closure cost estimate must include the cost of complying with the contingent closure plan (i.e., closure as a landfill) if that cost is greater than the costs of complying with the closure plan prepared for the expected closure. Applicable sections of Worksheets B-9 through B-14 should be completed for closing the tank system as a landfill.

If the tank system is to be closed as landfill, post-closure care must be performed. Applicable sections of post-closure Worksheets H-1 though H-6, H-8, and H-11 in Volume III should be used.

The treatment and storage tank closure worksheets address the following items:

- Inventory Management

  1. Inventory quantity (maximum)
  2. Containerization of bulk waste
  3. Container loading
  4. On-site treatment of liquid waste inventory
  5. Treated waste discharge to sewer
  6. Off-site management of inventory and/or treatment residue
  7. Solidification prior to on-site landfill disposal
  8. On-site disposal

- Testing for Soil Contamination

  1. Background samples and samples with potential contamination
  2. Preparation of isogram plan

- Decontamination

  1. Protective clothing and safety equipment for facility personnel
  2. Equipment decontamination
  3. Tank decontamination
  4. Double-walled steel tank interstitial space decontamination
  5. Vault decontamination
  6. Pad or foundation decontamination
  7. Sump or trough decontamination
  8. Other items needing decontamination
  9. On-site treatment of decontamination residues
  10. Testing for success of decontamination
  11. Treated residue discharge to sewer

12. Off-site management of decontamination fluid/residues and/or treatment residue
13. On-site disposal

- Foundation/Pad Removal

1. Protective clothing
2. Pad or foundation demolition
3. Equipment decontamination
4. On-site treatment of decontamination residues
5. Treated residue discharge to sewer
6. Off-site management of rubble, decontamination residue, and/or treatment residue
7. On-site disposal

- Tank Removal

1. Onground tank
2. Inground tank
3. Underground tank
4. Concrete slab or deadman removal (double-walled underground tanks only)
5. Off-site management of rubble, decontamination residue, and/or treatment residue
6. On-site disposal

- Secondary Containment System Removal

1. Protective clothing
2. External liner system removal
3. Vault system removal (underground tanks only)
4. Equipment decontamination
5. On-site treatment of decontamination residues
6. Treated residue discharge to sewer

7. Off-site management of rubble, decontamination residue, and/or treatment residue
8. On-site disposal

- Removal of Contaminated Soil

1. Protective clothing
2. Excavation of contaminated soil and earthen berms
3. Equipment decontamination
4. On-site treatment of decontamination residues
5. Treated residue discharge to sewer
6. Off-site management of contaminated soil, decontamination residues, and/or treatment residue
7. On-site disposal

- Certification of Final Closure

1. Independent registered professional engineer
2. Clerical

- Inspections and Repairs

1. Inspection
2. Fence installation or repair
3. Other security equipment repair

- Final Cover

1. Native soil for slope and fill
2. On-site clay
3. Off-site clay
4. Synthetic membrane
5. Sand

6. Gravel
7. Drainage tile
8. Geotextile filter fabric
9. Topsoil
10. Crushed stone
11. Mobilization/demobilization

- Revegetation

1. Soil preparation and grading
2. Seeding
3. Fertilizing
4. Mulching
5. Mobilization/demobilization

- Groundwater Monitoring Well Construction

1. Number of groundwater monitoring wells
2. Depth
3. Materials
4. Installation

- Groundwater Monitoring - Part 264 Only

1. Detection monitoring - background/upgradient wells
2. Compliance monitoring - background/upgradient wells
3. Administrative (reporting)
4. Monitoring well maintenance

- Groundwater Monitoring - Part 265 Only

1. Primary drinking water parameters analysis - background/ upgradient and downgradient wells

2. Groundwater quality analysis - background/upgradient and downgradient wells
3. Groundwater contamination analysis - background/upgradient and downgradient wells
4. Administrative (reporting)
5. Monitoring well maintenance

- Survey Plat - Final Closure
  1. Surveying of waste management area boundaries
  2. Fence posts to mark boundaries
  3. Plat submittal

WORKSHEET B-1

Inventory Management

1. Inventory Quantity (Maximum)

   a. Number of tanks _____

   b. Tank waste quantity (gal/tank) _____

   c. Total waste quantity (gal)
      Line 1a x Line 1b _____

2. Containerization of Bulk Waste

   a. Quantity of waste to be containerized (gal) _____*

   b. Container capacity (gal/container) _____ (55 gal/container; p. 4-6)

   c. Number of containers needed
      Line 2a ÷ Line 2b _____

   d. Containerization unit cost ($/container) _____ (p. 4-6)

   e. Containerization cost ($)
      Line 2c x Line 2d _____

3. Container Loading

   a. Number of pallets
      Line 2c ÷ 4
      (round up to nearest integer) _____

   b. Loading unit cost ($/pallet) _____ ($4.66/pallet; p.4-8)

   c. Container loading cost ($)
      Line 3a x Line 3b _____

4. On-Site Treatment of Liquid Waste Inventory

   a. Quantity of waste to be treated (gal) _____

WORKSHEET B-1 (page 2)

b. Chemicals required for treatment (lb/gal waste or gal/gal waste) _____ (pp. 4-12 - 4-13)

c. Chemicals unit cost ($/lb or $/gal) _____

d. Chemicals cost ($)
Line 4a x Line 4b x Line 4c _____

e. Electricity required for treatment (kwh/gal waste) _____ (pp. 4-12 - 4-13)

f. Electricity unit cost ($/kwh) _____ ($0.05/kwh; p. 4-2)

g. Electricity cost ($)
Line 4a x Line 4e x Line 4f _____

h. Water required for treatment (gal/gal waste) _____ (pp. 4-12 - 4-13)

i. Water unit cost ($/1000 gal) _____ ($1.22/1000 gal; p. 4-2)

j. Water cost ($)
[(Line 4a x Line 4h) ÷ 1000]
x Line 4i _____

k. Fuel required for treatment (MMBtu/gal waste) _____ (pp. 4-12 - 4-13)

l. Fuel unit cost ($/MMBtu) _____ (p. 4-2)

m. Fuel cost ($)
Line 4a x Line 4k x Line 4l _____

n. Labor required for treatment (hrs/gallon waste) _____ (pp. 4-12 - 4-13)

o. Process operator unit labor cost ($/hr) _____ ($26.50/hr; p. 9-3)

p. Labor cost ($)
Line 4a x Line 4n x Line 4o _____

q. On-site treatment cost ($)
Line 4d + Line 4g + Line 4j +
Line 4m + Line 4p _____

r. Residue generated from treatment (gal) _____

WORKSHEET B-1 (page 3)

5. Treated Waste Discharge to Sewer

   a. Volume of liquid discharged (gal) _____

   b. Sewer discharge unit cost ($/1000 gal) _____ ($1.50/1000 gal; p. 4-2)

   c. Sewer discharge cost ($)
   (Line 5a ÷ 1000) x Line 5b) _____

6. Off-Site Management of Inventory and/or Treatment Residue

   a. Quantity to be managed off-site (tons) _____*

   b. Truck capacity (tons) _____

   c. Number of loads
   Line 6a ÷ Line 6b
   (round up to nearest integer) _____

   d. One-way distance (mi/load) _____

   e. Transportation unit cost ($/mi) _____ ($4.50/mi; p. 4-15)**

   f. Transportation cost ($)
   Line 6c x Line 6d x Line 6e _____

   g. Off-site management unit cost ($/ton) _____ (pp. 4-13 - 4-20)

   h. Off-site management cost ($)
   Line 6a x Line 6g _____

   i. Off-site management subtotal ($)
   Line 6f + Line 6h _____

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* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET B-1 (page 4)

7. Solidification Prior to On-Site Landfill Disposal

   a. Quantity to be solidified (tons) _____*

   b. Type of solidification material _____

   c. Solidification unit cost ($/ton) _____ (p. 4-11)

   d. Solidification cost ($)
      Line 7a x Line 7c _____

   e. Change in waste quantity
      (factor $\geq$ 1) _____ (1.0; p. 4-11)

   f. Final solidified waste quantity (tons)
      Line 7a x (1 + Line 7e) _____

8. On-Site Disposal

   Include volume on one or more worksheets:
   Landfill Inventory - Line 1i, Line 1p
   Incinerator Inventory - Line 1e, Line 1f, Line 1n
   Land Treatment Inventory - Line 1b, Line 1d, Line 1o

9. Treatment/Storage Tank Inventory Management Subtotal ($)
   Line 2e + Line 3c + Line 4c + Line 5c + Line 6f + Line 7c _____

* Conversion factors are provided in the Volume III appendix.

WORKSHEET B-2

Testing for Soil Contamination

1. Background Samples and Samples with Potential Contamination

   a. Number of soil samples to be taken _____

   b. Number of samples requiring coring through concrete/asphalt foundations/pads _____

   c. Thickness of foundation/pad (inches) _____

   d. Unit cost for coring through/removing concrete/asphalt foundations/pads ($/sample) _____ ($15/inch; p. 6-1)

   e. Sample collection time required (hrs/sample) _____ (1 hr/sample; p. 2-12)

   f. Transportation time to and from site (hrs) _____

   g. Contract lab technician unit labor cost ($/hr) _____ ($20.50/hr; p. 9-3)

   h. Sample collection time (hrs) (Line 1a x Line 1e) + Line 1f _____

   i. Sampling cost ($) (Line 1b x Line 1c x Line 1d (Line 1g x Line 1h) _____

   j. Contract lab fee ($/sample) _____ (p. 2-13)

   k. Contract lab cost ($) Line 1a x Line 1j _____

   l. Sample cost ($) Line 1i + Line 1k _____

2. Preparation of Isogram Plan

   a. Engineer time required (hrs) _____

   b. Engineer unit labor cost ($/hr) _____ ($45.50/hr; p. 9-3)

   c. Engineer cost ($) Line 2a x Line 2b _____

   d. Draftsperson time required (hrs) _____

   e. Draftsperson unit labor cost ($/hr) _____ ($24/hr; p. 9-3)

WORKSHEET B-2 (page 2)

f. Draftsperson cost ($)
Line 2d x Line 2e _____

g. Clerical time required (hrs) _____

h. Clerical unit labor cost ($/hr) _____ ($18/hr; p. 9-3)

i. Clerical cost ($)
Line 2g x Line 2h _____

j. Isogram plan cost ($)
Line 2c + Line 2f + Line 2i _____

3. Soil Testing Subtotal ($)
Line 1l + Line 2j _____

WORKSHEET 3-3

Decontamination

1. Protective Clothing and Safety Equipment for Facility Personnel

   a. Number of personnel requiring protective clothing and safety equipment for decontamination _____

   b. Safety equipment and protective clothing unit cost ($/person) _____ ($80/person; p. 5-6)

   c. Safety equipment and protective clothing cost ($)
   Line 1a x Line 1b _____

2. Equipment Decontamination

   a. Equipment needing decontamination:

   - pumps and feed lines
   - heavy equipment (e.g., fork lifts, dozers, etc.)
   - other equipment (list)_____

   _____

   b. Number of pumps and lines _____

   c. Pumps and lines decontamination cost ($) _____(p. 5-4)

   d. Residual generation rate for pump and line decontamination _____(50 gal/pump and line; p. 5-1)

   e. Residual generated from pump and line decontamination (gal)
   Line 2b x Line 2d _____

   f. Heavy equipment decontamination cost ($) _____(p. 5-2)

   g. Total heavy equipment decontamination time (hrs) _____(p. 5-2)

   h. Residual generation rate for heavy equipment decontamination (gal/hr) _____(100 gal/hr; p. 5-1)

WORKSHEET 3-3 (page 2)

i. Residual generated from heavy equipment decontamination (gal)
Line 2g x Line 2h _____

j. Equipment decontamination cost ($)
Line 2c + Line 2f _____

k. Contaminated fluid and/or residues generated (gal)
Line 2e + Line 2i _____

3. Tank Decontamination

a. Number of personnel entering tanks _____

b. Additional personnel safety equipment unit cost ($/person) _____ ($172/person; p. 5-6)

c. Additional personnel safety equipment cost ($)
Line 3a x Line 3b _____

d. Method of tank decontamination _____

e. Tank area to be decontaminated (ft^2) _____

f. Tank decontamination unit cost ($/$ft^2$) _____ (p. 5-3)

g. Tank decontamination cost ($)
Line 3e x Line 3f _____

h. Tank decontamination subtotal before surcharge ($)
Line 3c + Line 3g _____

i. Surcharge factor (factor ≥ 1) _____ (2.0; p. 5-6)

j. Tank decontamination subtotal ($)
Line 3h x (1 + Line 3i) _____

k. Volume of tank(s) to be filled with sand (gal) _____

WORKSHEET B-3 (page 3)

l. Sand purchase and placement unit cost ($/gal) _____ ($0.10/gal; p. 5-7)

m. Tank decontamination and sand filling cost ($)
Line 3j + (Line 3k x Line 3l) _____

n. Residual generation rate for tank decontamination (gal/ft^2) _____ (p. 5-3)

o. Contaminated fluid and/or residues generated (gal)
Line 3e x Line 3n _____

4. Double Walled Steel Tank Interstitial Space Decontamination

a. Method of tank decontamination _____ (steamcleaning)

b. Tank area to be decontaminated (ft^2) _____

c. Tank decontamination unit cost ($/$ft^2$) _____ ($0.55/ft^2; p. 5-3)

d. Tank decontamination cost ($)
Line 4b x Line 4c _____

e. Residual generation rate for tank decontamination (gal/ft^2) _____ (4 gal/ft^2; p. 5-3)

f. Contaminated fluid and/or residues generated (gal)
Line 4b x Line 4e _____

5. Vault Decontamination

a. Number of personnel entering vault _____

b. Additional personnel safety equipment unit cost ($/person) _____ ($172/person; p. 5-6)

c. Additional personnel safety equipment cost ($)
Line 5a x Line 5b _____

d. Method of vault decontamination _____

e. Vault area to be decontaminated (ft^2) _____

WORKSHEET B-3 (page 4)

f. Vault decontamination unit cost ($/ft^2) _____ (p. 5-3)

g. Vault decontamination cost ($)
Line 5e x Line 5f _____

h. Vault decontamination subtotal before surcharge ($)
Line 5c + Line 5g _____

i. Surcharge factor (factor $\geq$1) _____ (2.0; p. 5-6)

j. Vault decontamination subtotal ($)
Line 5h x (1 + Line 5i) _____

k. Volume of vault(s) to be filled with sand (gal) _____

l. Sand purchase and placement unit cost ($/gal) _____ ($0.10/gal; p. 5-7)

m. Vault decontamination and sand filling cost ($)
Line 5j + (Line 5k x Line 5l) _____

n. Residual generation rate for vault decontamination (gal/ft^2) _____ (p. 5-3)

o. Contaminated fluid and/or residues generated (gal)
Line 5e x Line 5n _____

6. Pad or Foundation Decontamination

a. Method of pad decontamination _____

b. Pad area to be decontaminated (ft^2) _____

c. Pad decontamination unit cost ($/ft^2) _____ (p. 5-3)

d. Pad decontamination subtotal ($)
Line 6b x Line 6c _____

e. Residual generation rate for pad/foundation decontamination (gal/ft^2) _____ (p. 5-3)

f. Contaminated fluid and/or residues generated (gal)
Line 6b x Line 6e _____

WORKSHEET B-3 (page 5)

7. Sump or Trough Decontamination

   a. Method of sump or trough decontamination _____

   b. Volume to be pumped from sump or trough(s) (gal) _____

   c. Time required for pumping (hrs)
      Line 7b ÷ 8000
      (round up to nearest integer) _____

   d. Pumping unit cost ($/hr) _____ ($23/hr; D. 4-11)

   e. Pump rental cost, optional ($/hr) _____ ($2.70/hr; D. 4-11)

   f. Pumping cost ($)
      (Line 7c x Line 7d) + Line 7e _____

   g. Sump or trough area to be decontaminated (ft^2) _____

   h. Sump or trough decontamination unit cost ($/$ft^2$) _____ (D. 5-3)

   i. Sump or trough decontamination cost ($)
      Line 7g x Line 7h _____

   j. Sump or trough decontamination subtotal ($)
      Line 7f + Line 7i _____

   k. Residual generation rate for sump or trough decontamination (gal/ft^2) _____ (D. 5-3)

   l. Contaminated fluid and/or residues generated (gal)
      Line 7b + (Line 7g x Line 7k) _____

8. Other Items Needing Decontamination

   a. List items _____

      _____

   b. Method of decontamination for other items _____

WORKSHEET B-3 (page 6)

c. Surface area of other items to be decontaminated (ft^2) _____

d. Decontamination unit cost ($/$ft^2$) _____ (p. 5-3)

e. Decontamination of other items subtotal ($)
Line 8c x Line 8d _____

f. Residual generation rate for decontamination of other items (gal/ft^2) _____ (p. 5-3)

g. Contaminated fluid and/or residues generated (gal)
Line 8c x Line 8f _____

9. On-Site Treatment of Decontamination Residues

a. Quantity of residue to be treated (gal) _____

b. Chemicals required for treatment (lb/gal residue or gal/gal residue) _____ (pp. 4-12 - 4-13)

c. Chemicals unit cost ($/lb or $/gal) _____

d. Chemicals cost ($)
Line 9a x Line 9b x Line 9c _____

e. Electricity required for treatment (kwh/gal residue) _____ (pp. 4-12 - 4-13)

f. Electricity unit cost ($/kwh) _____ ($0.05/kwh; p. 4-2)

g. Electricity cost ($)
Line 9a x Line 9e x Line 9f _____

h. Water required for treatment (gal/gal residue) _____ (pp. 4-12 - 4-13)

i. Water unit cost ($/1000 gal) _____ ($1.22/1000 gal; p. 4-2)

j. Water cost ($)
[(Line 9a x Line 9h) ÷ 1000] x Line 9i _____

k. Fuel required for treatment (MMBtu/gal residue) _____ (pp. 4-12 - 4-13)

WORKSHEET B-3 (page 7)

l. Fuel unit cost ($/MMBtu) _____ (p. 4-2)

m. Fuel cost ($)
Line 9a x Line 9k x Line 9l _____

n. Labor required for treatment
(hrs/gallon residue) _____ (pp. 4-12 - 4-13)

o. Process operator unit labor cost
($/hr) _____ ($26.50/hr; p. 9-3)

p. Labor cost ($)
Line 9a x Line 9n x Line 9o _____

q. On-site treatment cost ($)
Line 9d + Line 9g + Line 9j +
Line 9m + Line 9p _____

r. Residue generated from treatment
(gal) _____

10. Testing for Success of Decontamination

a. Number of samples _____

b. Sample collection time required
(hrs/sample) _____

c. Technician unit labor cost ($/hr) _____ ($20.50/hr; p. 9-3)

d. Sample collection time (hrs)
Line 10a x Line 10b _____

e. Sampling cost ($)
Line 10c x Line 10d _____

f. Cost to test each sample
($/sample) _____ (pp. 5-10 - 5-11)

g. Testing cost ($)
Line 10a x Line 10f _____

h. Testing for success of
decontamination
Line 10e + Line 10g _____

11. Treated Residue Discharge to Sewer

a. Volume of liquid discharged (gal) _____

WORKSHEET B-3 (page 8)

b. Sewer discharge unit cost ($/1000 gal) _____ ($1.50/1000 gal; p. 4-2)

c. Sewer discharge cost ($)
(Line 11a ÷ 1000) x Line 11b _____

12. Off-Site Management of Decontamination Fluid/Residues and/or Treatment Residue

a. Off-site management method _____

b. Quantity to be managed off-site (tons) _____*

c. Truck capacity (tons) _____

d. Number of loads
Line 12b ÷ Line 12c
(round up to nearest integer) _____

e. One-way distance (mi/load) _____

f. Transportation unit cost ($/mi) _____ ($4.50/mi; p. 4-15)**

g. Transportation cost ($)
Line 12d x Line 12e x Line 12f _____

h. Off-site management unit cost ($/ton) _____ (pp. 4-13 - 4-20)

i. Off-site management cost ($)
Line 12b x Line 12h _____

j. Contaminated fluid and residue disposal subtotal ($)
Line 12g + Line 12i _____

13. On-Site Disposal

Include volume on one or more worksheets:
Landfill Inventory - Line 1n, Line 1p
Incinerator Inventory - Line 1l, Line 1n
Land Treatment Inventory - Line 1k, Line 1o

14. Facility Decontamination Subtotal ($)
Line 1c + Line 2j + Line 3m + Line 4d +
Line 5m + Line 6d + Line 7j + Line 8e +
Line 9q + Line 10h + Line 11c + Line 12j

* Conversion factors are provided in the Volume III appendix.
** Based on a 250-mile one-way distance.

WORKSHEET B-4

Foundation/Pad Removal

1. Protective Clothing

   a. Number of personnel requiring protective clothing for demolition _____

   b. Protective clothing unit cost ($/person) _____ ($77/person; p. 6-8)

   c. Protective clothing cost ($)
   Line 1a x Line 1b _____

2. Pad or Foundation Demolition

   a. Volume of pad/foundation to be demolished (yd^3) _____

   b. Demoliton unit cost ($/$yd^3$) _____ ($82/yd^3; p. 6-1)

   c. Pad/foundation loading unit cost ($/$yd^3$) _____ (p. 4-7)

   d. Demolition and loading cost ($)
   Line 2a x (Line 2b + Line 2c) _____

   e. Mobilization/demolition cost ($) _____ (p. 4-7)

   f. Pad/foundation demolition and loading cost before surcharge ($)
   Line 2d + Line 2e _____

   g. Surcharge factor _____ (1.0; pp. 6-8 - 6-9)

   h. Foundation demolition cost ($)
   Line 2f x (1 + Line 2g) _____

3. Equipment Decontamination

   a. Total heavy equipment decontamination time (hrs) _____ (p. 5-2)

   b. Heavy equipment decontamination cost ($) _____ (p. 5-2)

   c. Residual generation rate for heavy equipment decontamination (gal/hr) _____ (100 gal/hr; p. 5-1)

   d. Contaminated fluid and/or residue generated (gal)
   Line 3a x Line 3c _____

WORKSHEET B-4 (page 2)

4. On-Site Treatment of Decontamination Residues

a. Quantity of residue to be treated (gal) _____

b. Chemicals required for treatment (lb/gal residue or gal/gal residue) _____ (pp. 4-12 - 4-13)

c. Chemicals unit cost ($/lb or $/gal) _____

d. Chemicals cost ($)
Line 4a x Line 4b x Line 4c _____

e. Electricity required for treatment (kwh/gal residue) _____ (pp. 4-12 - 4-13)

f. Electricity unit cost ($/kwh) _____ ($0.05/kwh; p. 4-2)

g. Electricity cost ($)
Line 4a x Line 4e x Line 4f _____

h. Water required for treatment (gal/gal residue) _____ (pp. 4-12 - 4-13)

i. Water unit cost ($/1000 gal) _____ ($1.22/1000 gal; 4-2)

j. Water cost ($)
[(Line 4a x Line 4h) ÷ 1000]
x Line 4i _____

k. Fuel required for treatment (MMBtu/gal residue) _____ (pp. 4-12 - 4-13)

l. Fuel unit cost ($/MMBtu) _____ (p. 4-2)

m. Fuel cost ($)
Line 4a x Line 4k x Line 4l _____

n. Labor required for treatment (hrs/gallon residue) _____ (pp. 4-12 - 4-13)

o. Process operator unit labor cost ($/hr) _____ ($26.50/hr; p. 9-3)

p. Labor cost ($)
Line 4a x Line 4n x Line 4o _____

q. On-site treatment cost ($)
Line 4d + Line 4g + Line 4j +
Line 4m + Line 4p _____

r. Residue generated from treatment (gal) _____

WORKSHEET B-4 (page 3)

5. Treated Residue Discharge to Sewer

   a. Volume of liquid discharged (gal) _____

   b. Sewer discharge unit cost ($/1000 gal) _____ ($1.50/1000 gal; p. 4-2)

   c. Sewer discharge cost ($) (Line 5a ÷ 1000) x Line 5b _____

6. Off-Site Management of Rubble, Decontamination Residue, and/or Treatment Residue

   a. Volume to be managed off-site (tons) _____*

   b. Truck capacity (tons) _____

   c. Number of loads Line 6a ÷ Line 6b (round up to nearest integer) _____

   d. Transportation unit cost ($/mi) _____ ($4.50/mi; p. 4-15)**

   e. One-way distance (mi/load) _____

   f. Transportation cost ($) Line 6c x Line 6d x Line 6e _____

   g. Off-site management unit cost ($/ton) _____ (pp. 4-13 - 4-20)

   h. Off-site management cost ($) Line 6a x Line 6g _____

   i. Off-site management subtotal ($) Line 6f + Line 6i _____

7. On-Site Disposal

   Include volume on one or more worksheets:
   Landfill Inventory - Line 1m, Line 1n, Line 1p
   Incinerator Inventory - Line 1l, Line 1n
   Land Treatment Inventory - Line 1k, Line 1o

8. Demolition and Removal Subtotal ($) Line 1c + Line 2h + Line 3b + Line 4q + Line 5c + Line 6i [ ]

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* Conversion factors are provided in the Volume III appendix.
** Based on a 250-mile one-way distance.

WORKSHEET B-5

Tank Removal

1. Onground Tank

   a. Tank surface area (ft^2) _____ (p. 5-3)

   b. Tank removal unit cost ($/$ft^2$) _____ (p. 5-9)

   c. Tank removal cost ($)
      Line 1a x Line 1b _____

2. Inground Tank

   a. Cover removal (hrs) _____ (p. 5-7)

   b. Cover removal unit cost ($/hr) _____ ($200/hr; p. 5-7)

   c. Cover removal cost ($)
      Line 2a x Line 2b _____

   d. Tank wall surface area (ft^2) _____ (p. 5-5)

   e. Tank wall thickness (ft) _____

   f. Volume of tank wall to be demolished (yd^3)
      (Line 2d x Line 2e) ÷ 27 _____

   g. Tank wall demolition unit cost ($/$yd^3$) _____ (p. 5-8)

   h. Tank wall loading unit cost ($/$yd^3$) _____ (pp. 6-3 - 6-4)

   i. Tank wall demolition and loading cost ($)
      Line 2f x (Line 2g + Line 2h) _____

   j. Mobilization/demobilization cost ($) _____ (pp. 5-7 and 6-3)

   k. Tank wall demolition and loading cost before surcharge ($)
      Line 2i + Line 2j _____

   l. Surcharge _____ (1.0; pp. 6-8 - 6-9)

   m. Inground tank demolition and loading cost ($)
      Line 2k x (1 + Line 2l) _____

WORKSHEET B-5 (page 2)

3. Underground Tank

a. Cover removal (hrs) _____ (p. 5-7)

b. Cover removal unit cost ($/hr) _____ ($200/hr; p. 5-7)

c. Cover removal cost ($)
Line 3a x Line 3b _____

d. Volume of contaminated soil to be removed (yd^3) _____

e. Excavation and loading unit cost ($/$yd^3$) _____ (pp. 6-3 - 6-7)

f. Mobilization/demobilization cost ($) _____ (pp. 5-7 and 6-3)

g. Contaminated soil excavation and loading cost ($)
(Line 3d x Line 3e) + Line 3f _____

h. Tank surface area (ft^2) _____ (p. 5-3)

i. Tank removal unit cost ($/$ft^2$) _____ (p. 5-9)

j. Tank removal cost ($)
Line 3h x Line 3i _____

k. Surcharge _____ (1.0; pp. 6-8 - 6-9)

l. Underground tank removal cost ($)
(Line 3g + Line 3j) x (1 x Line 3k) _____

4. Concrete Slab or Deadman Removal
(double-walled underground tanks only)

a. Volume of concrete slab or deadman to be demolished (yd^3) _____

b. Demolition unit cost ($/$yd^3$) _____ ($82/yd^3; p. 6-1)

c. Concrete slab or deadman loading unit cost ($/$yd^3$) _____ (pp. 6-3 - 6-4)

d. Demolition and loading cost ($)
Line 4a x (Line 4b + Line 4c) _____

e. Mobilization/demobilization cost ($) _____ (p. 6-3)

f. Concrete slab or deadman demolition and loading cost before surcharge ($)
Line 4d + Line 4e _____

WORKSHEET B-5 (page 3)

g. Surcharge factor _____ (1.0; pp. 6-8 - 6-9)

h. Concrete slab or deadman demolition cost ($)
Line 4f x (1 + Line 4g) _____

5. Off-Site Management of Rubble, Decontamination Residue, and/or Treatment Residue

a. Volume to be managed off-site (tons) _____*

b. Truck capacity (tons) _____

c. Number of loads
Line 5a ÷ Line 5b
(round up to nearest integer _____

d. Transportation unit cost ($/mi) _____ ($4.50/mi; p. 4-15)**

e. One-way distance (mi/load) _____

f. Transportation cost ($)
Line 5c x Line 5d x Line 5e _____

g. Off-site management unit cost ($/ton) _____ (pp. 4-19 - 4-20)

h. Off-site management cost ($)
Line 5a x Line 5g _____

i. Off-site management subtotal ($)
Line 5f + Line 5i _____

6. On-Site Disposal

Include volume on one or more worksheets:
Landfill Inventory - Line 1m, Line 1n, Line 1o
Incinerator Inventory - Line 1l, Line 1n
Land Treatment Inventory - Line 1k, Line 1o

7. Tank Removal Subtotal ($)
Line 1c + Line 2m + Line 3l + Line 4h + Line 5i

* Conversion factors are provided in the Volume III appendix.

** Based on 250-mile one-way distance.

WORKSHEET B-6

Secondary Containment System Removal

1. Protective Clothing

   a. Number of personnel requiring protective clothing for excavation _____

   b. Protective clothing unit cost ($/person) _____ ($77/person; p. 6-8)

   c. Protective clothing cost ($)
   Line 1a x Line 1b _____

2. External Liner System Removal

   a. Volume of external liner system to be removed (yd^3) _____

   b. Excavation unit cost, including loading ($/$yd^3$) _____ (pp. 6-3 - 6-7)

   c. External liner system removal cost ($)
   Line 2a x Line 2b _____

   d. Volume of foundation wall to be demolished (yd^3) - onground tanks only _____

   e. Demolition unit cost ($/$yd^3$) _____ (p. 6-2)

   f. Foundation wall loading unit cost ($/$yd^3$) _____ (p. 4-7)

   g. Foundation wall demolition and loading cost ($)
   Line 2d x (Line 2e + Line 2f) _____

   h. Mobilization/demobilization cost ($) _____ (pp. 4-5, 4-7, 4-10, and 6-3)

   i. External liner system and foundation wall removal cost before surcharge ($)
   Line 2c + Line 2g + Line 2h _____

   j. Surcharge factor _____ (1.0; pp. 6-8 - 6-9)

   k. External liner system and foundation wall removal cost ($)
   Line 2i x (1 + Line 2j) _____

WORKSHEET B-6 (page 2)

3. Vault System Removal (underground tanks only)

   a. Volume of concrete vault to be demolished (yd^3) _____

   b. Demolition unit cost ($/$yd^3$) _____ (p. 6-2)

   c. Concrete vault loading unit cost ($/$yd^3$) _____ (p. 6-4)

   d. Concrete vault demolition and loading cost ($)
   Line 3a x (Line 3b + Line 3c) _____

   e. Mobilization/demobilization cost ($) _____ (p. 6-3)

   f. Concrete vault demolition and loading cost before surcharge ($)
   Line 3d + Line 3e _____

   g. Surcharge factor _____ (1.0; pp. 6-8 - 6-9)

   h. Concrete vault demolition cost ($)
   Line 3f x (1 + Line 3g) _____

4. Equipment Decontamination

   a. Total heavy equipment decontamination time (hrs) _____ (p. 5-2)

   b. Heavy equipment decontamination cost ($) _____ (p. 5-2)

   c. Residual generation rate for heavy equipment decontamination (gal/hr) _____ (100 gal/hr; p. 5-1)

   d. Contaminated fluid and/or residue generated (gal)
   Line 4a x Line 4c _____

5. On-Site Treatment of Decontamination Residues

   a. Quantity of residue to be treated (gal) _____

   b. Chemicals required for treatment (lb/gal residue or gal/gal residue) _____ (pp. 4-12 - 4-13)

WORKSHEET B-6 (page 3)

c. Chemicals unit cost ($/lb or $/gal) _____

d. Chemicals cost ($)
Line 5a x Line 5b x Line 5c _____

e. Electricity required for treatment (kwh/gal residue) _____ (pp. 4-12 - 4-13)

f. Electricity unit cost ($/kwh) _____ ($0.05/kwh; p. 4-2)

g. Electricity cost ($)
Line 5a x Line 5e x Line 5f _____

h. Water required for treatment (gal/gal residue) _____ (pp. 4-12 - 4-13)

i. Water unit cost ($/1000 gal) _____ ($1.22/1000 gal; p. 4-2)

j. Water cost ($)
[(Line 5a x Line 5h) ÷ 1000] x Line 5i _____

k. Fuel required for treatment (MMBtu/gal residue) _____ (pp. 4-12 - 4-13)

l. Fuel unit cost ($/MMBtu) _____ (p. 4-2)

m. Fuel cost ($)
Line 5a x Line 5k x Line 5l _____

n. Labor required for treatment (nrs/gallon residue) _____ (pp. 4-12 - 4-13)

o. Process operator unit labor cost ($/hr) _____ ($26.50/hr; p. 9-3)

p. Labor cost ($)
Line 5a x Line 5n x Line 5o _____

q. On-site treatment cost ($)
Line 5d + Line 5g + Line 5j + Line 5m + Line 5p _____

r. Residue generated from treatment (gal) _____

WORKSHEET B-6 (page 4)

6. Treated Residue Discharge to Sewer

   a. Volume of liquid discharged (gal) _____

   b. Sewer discharge unit cost ($/1000 gal) _____ ($1.50/1000 gal; p. 4-2)

   c. Sewer discharge cost ($)
   (Line 6a ÷ 1000) x Line 6b _____

7. Off-Site Management of Rubble, Decontamination Residue, and/or Treatment Residue

   a. Volume to be managed off-site (tons) _____*

   b. Truck capacity (tons) _____

   c. Number of loads
   Line 7a ÷ Line 7b
   (round up to nearest integer) _____

   d. Transportation unit cost ($/mi) _____ ($4.50/mi; p. 4-15)**

   e. One-way distance (mi/load) _____

   f. Transportation cost ($)
   Line 7c x Line 7d x Line 7e _____

   g. Off-site management unit cost ($/ton) _____ (pp. 4-13 - 4-20)

   h. Off-site management cost ($)
   Line 7a x Line 7g _____

   i. Off-site management subtotal ($)
   Line 7f + Line 7h _____

8. On-Site Disposal

   Include volume on one or more worksheets:
   Landfill Inventory - Line 1m, Line 1n, Line 1p
   Incinerator Inventory - Line 1l, Line 1n
   Land Treatment Inventory - Line 1k, Line 1o

9. Containment/Liner System Removal Subtotal ($)
   Line 1c + Line 2k + Line 3h + Line 4b +
   Line 5q + Line 6c + Line 7i _____

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* Conversion factors are provided in the Volume III appendix.
** Based on a 250-mile one-way distance.

WORKSHEET B-7

Removal of Contaminated Soil

1. Protective Clothing

   a. Number of personnel requiring protective clothing for excavation and decontaminating _____

   b. Protective clothing unit cost ($/person) _____ ($77/person; p. 6-8)

   c. Protective clothing cost ($)
   Line 1a x Line 1b _____

2. Excavation of Contaminated Soil and Earthen Berms

   a. Volume of contaminated soil/ berms to be removed (yd^3) _____

   b. Excavation unit cost, including loading ($/$yd^3$) _____ (pp. 6-3 - 6-7)

   c. Mobilization/demobilization cost ($) _____ (pp. 4-5, 4-7, 4-10, and 6-3)

   d. Contaminated soil/berm removal cost before surcharge ($)
   (Line 2a x Line 2b) + Line 2c _____

   e. Surcharge factor _____ (1.0; pp. 6-8 - 6-9)

   f. Contaminated soil/berm removal subtotal ($)
   Line 2d x (1 + Line 2e) _____

3. Equipment Decontamination

   a. Total heavy equipment decontamination time (hrs) _____ (p. 5-2)

   b. Heavy equipment decontamination cost ($) _____ (p. 5-2)

   c. Residual generation rate for heavy equipment decontamination (gal/hr) _____ (100 gal/hr; p. 5-1)

   d. Contaminated fluid and/or residues generated (gal)
   Line 3a x Line 3c _____

WORKSHEET 5-7 (page 2)

4. On-Site Treatment of Decontamination Residues

a.	Quantity of residue to be treated (gal)	_____
b.	Chemicals required for treatment (lb/gal residue or gal/gal residue)	_____ (pp. 4-12 - 4-13)
c.	Chemicals unit cost ($/lb or $/gal)	_____
d.	Chemicals cost ($) Line 4a x Line 4b x Line 4c	_____
e.	Electricity required for treatment (kwh/gal residue)	_____ (pp. 4-12 - 4-13)
f.	Electricity unit cost ($/kwh)	_____ ($0.05/kwh; p. 4-2)
g.	Electricity cost ($) Line 4a x Line 4e x Line 4f	_____
h.	Water required for treatment (gal/gal residue)	_____ (pp. 4-12 - 4-13)
i.	Water unit cost ($/1000 gal)	_____ ($1.22/1000 gal; p. 4-2)
j.	Water cost ($) [(Line 4a x Line 4h) ÷ 1000] x Line 4i	_____
k.	Fuel required for treatment (MMBtu/gal residue)	_____ (pp. 4-12 - 4-13)
l.	Fuel unit cost ($/MMBtu)	_____ (p. 4-2)
m.	Fuel cost ($) Line 4a x Line 4k x Line 4l	_____
n.	Labor required for treatment (hrs/gallon residue)	_____ (pp. 4-12 - 4-13)
o.	Process operator unit labor cost ($/hr)	_____ ($26.50/hr; p. 9-3)
p.	Labor cost ($) Line 4a x Line 4n x Line 4o	_____

WORKSHEET B-7 (page 3)

q. On-site treatment cost ($)
Line 4d + Line 4g + Line 4j +
Line 4m + Line 4p _____

r. Residue generated from treatment
(gal) _____

5. Treated Residue Discharge to Sewer

a. Volume of liquid discharged (gal) _____

b. Sewer discharge unit cost
($/1000 gal) _____ ($1.50/1000 gal;
p. 4-2)

c. Sewer discharge cost ($)
(Line 5a ÷ 1000) x Line 5b _____

6. Off-Site Management of Contaminated
Soil, Decontamination Residue, and/or
Treatment Residue

a. Quantity to be managed off-site
(tons) _____*

b. Truck capacity (tons) _____

c. Number of loads
Line 6a ÷ Line 6b
(round up to nearest integer) _____

d. One-way distance (mi/load) _____

e. Transportation unit cost ($/mi) _____($4.50/mi; p. 4-15)**

f. Transportation cost ($)
Line 6c x Line 6d x Line 6e _____

g. Off-site management unit
cost ($/ton) _____(pp. 4-13 - 4-20)

h. Off-site management cost ($)
Line 6a x Line 6g _____

i. Off-site management subtotal ($)
Line 6f + Line 6h _____

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* Conversion factors are provided in the Volume III appendix.
** Based on a 250-mile one-way distance.

WORKSHEET B-7 (page 4)

7. On-Site Disposal

Include volume on one or more worksheets:
Landfill Inventory - Line 1n, Line 1o, Line 1p
Incinerator Inventory - Line 1l, Line 1n, Line 1o
Land Treatment Inventory - Line 1k, Line 1l, Line 1o

8. Contaminated Soil Removal Subtotal ($)
Line 1c + Line 2f + Line 3b + Line 4a +
Line 5c + Line 6i

WORKSHEET B-8

Certification of Final Closure

1. Independent Registered Professional Engineer

   a. Initial review of closure plan (hrs) _____ (8 hrs; p. 8-4)

   b. Inspection frequency (inspections/wk) _____ (p. 8-3)

   c. Inspection time required (hrs/inspection) _____ (p. 8-3)

   d. Number of weeks for closure (wks) _____

   e. Inspection time required (hrs) Line 1b x Line 1c x Line 1d _____

   f. Prepare final documentation (hrs) _____ (4 hrs; p. 8-4)

   g. Total professional engineer time required (hrs) Line 1a + Line 1e + Line 1f _____

   h. Professional engineer unit labor cost ($/hr) _____ ($45.50/hr; p. 8-3)

   i. Professional engineer cost ($) Line 1g x Line 1h _____

2. Clerical*

   a. Clerical time required (hrs/wk) _____ (2 hrs/wk; p. 8-3)

   b. Clerical unit labor cost ($/hr) _____ ($18/hr; p. 8-3)

   c. Clerical cost ($) Line 1d x Line 2a x Line 2b _____

3. Certification of Closure Subtotal ($) Line 1i + Line 2c _____

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* Clerical time should be included only if the Professional Engineer is operating independently in a single-person business.

WORKSHEET B-9

Inspection and Repairs

1. Inspection

   a. Time required for inspection by technician (hrs) _____

   b. Technician unit labor cost ($/hr) _____ ($20.50/hr; p. 9-3)

   c. Technician cost ($)
   Line 1a x Line 1b _____

   d. Engineer time required (hrs) _____

   e. Engineer unit labor cost ($/hr) _____ ($45.50/hr; p. 9-3)

   f. Engineer cost ($)
   Line 1d x Line 1e _____

   g. Clerical time required (hrs) _____

   h. Clerical unit labor cost ($/hr) _____ ($18/hr; p. 9-3)

   i. Clerical cost ($)
   Line 1g x Line 1h _____

   j. Inspection subtotal ($)
   Line 1c + Line 1f + Line 1i _____

2. Fence Installation or Repair

   a. Amount of fence to be installed or replaced (L.F.) _____

   b. Fencing unit cost ($/L.F.) _____ ($10.55/L.F.; p. 3-8)

   c. Fence cost ($)
   Line 2a x Line 2b _____

   d. Number of gates needed _____

   e. Gate unit cost ($/gate) _____ ($80/gate; p. 3-8)

   f. Gate cost ($)
   Line 2d x Line 2e _____

   g. Number of fence posts needed _____

   h. Fence post unit cost ($/post) _____ ($57/post; p. 3-8)

WORKSHEET B-9 (page 2)

i. Fence post cost ($)
Line 2g x Line 2h _____

j. Fence installation/repair cost ($)
Line 2c + Line 2f + Line 2i _____

3. Other Security Equipment Repair

a. Types of equipment needing repair or replacement _____

b. Number of items needing replacement _____

c. Replacement unit cost ($/item) _____ (p. 3-8)

d. Security equipment replacement cost ($)
Line 3b x Line 3c _____

4. Inspection and Repairs Subtotal ($)
Line 1j + Line 2j + Line 3d _____

WORKSHEET B-10

Final Cover

1. Native Soil for Slope and Fill

a.	Length of area to be capped (yd)	_____
b.	Width of area to be capped (yd)	_____
c.	Quantity needed (yd^3)	_____ (*)
d.	Excavation unit cost ($/$yd^3$)	_____
e.	Placement and spreading unit cost ($/$yd^3$)	_____ ($2.48/$yd^3$; p. 7-6)
f.	Compaction unit cost ($/$yd^3$)	_____ ($2.25/$yd^3$; p. 7-6)
g.	Total native soil unit cost ($/$yd^3$) Line 1d + Line 1e + Line 1f	_____ ($1.04/$yd^3$; p. 7-6)
h.	Percent compaction (decimal < 1)	_____ (0.25; p. 7-10)
i.	Native soil cost ($) Line 1c x Line 1g x (1 + Line 1h)	_____

2. On-Site Clay

a.	Area to be capped (yd^2) Line 1a x Line 1b	_____
b.	Depth of clay needed (yd)	_____
c.	Quantity needed (yd^3) Line 2a x Line 2b	_____
d.	Excavation unit cost ($/$yd^3$)	_____ ($4.05/$yd^3$; p. 7-10)
e.	Placement/spreading unit cost ($/$yd^3$)	_____ ($2.25/$yd^3$; p. 7-10)
f.	Compaction unit cost ($/$yd^3$)	_____ ($2.41/$yd^3$; p. 7-10)
g.	Total on-site clay unit cost ($/$yd^3$) Line 2d + Line 2e + Line 2f	_____ ($8.71/$yd^3$; pp. 7-10 - 7-11)

* Formula provided in Final Cover and Revegetation chapter of Volume III.

WORKSHEET B-10 (page 2)

h. Percent compaction (decimal < 1) _____ (0.25; p. 7-10)

i. Clay lift thickness (yd) _____ (0.22 yd; p. 7-12)

j. Number of lifts
Line 2b ÷ Line 2i _____

k. Number of samples to be tested/lift (samples/lift) _____ (3 samples/lift; p. 7-12)

l. Number of samples to be tested
Line 2j x Line 2k _____

m. Clay testing unit cost ($/sample) _____ ($230/sample; p. 7-12)

n. Clay testing cost
Line 2l x Line 2m _____

o. On-site clay cost ($)
Line 2c x Line 2g x (1 + Line 2n) + Line 2n _____

3. Off-Site Clay

a. Area to be capped (yd^2)
Line 1a x Line 1b _____

b. Depth of clay needed (yd) _____ (0.67 yd; p. 7-4)

c. Quantity needed (yd^3)
Line 3a x Line 3b _____

d. Purchase unit cost ($/$yd^3$) _____ ($4.75/yd^3; p. 7-13)

e. Delivery unit cost ($/$yd^3$) _____ ($10.16/yd^3; p. 7-13)

f. Spreading unit cost ($/$yd^3$) _____ ($1.03/yd^3; p. 7-13)

g. Compaction unit cost ($/$yd^3$) _____ ($2.41/yd^3; p. 7-13)

h. Total off-site clay unit cost ($/$yd^3$)
Line 3d + Line 3e + Line 3f + Line 3g _____ ($18.35/$yd^3$; pp. 7-13 - 7-14)

i. Percent compaction (decimal < 1) _____ (0.40; p. 7-10)

j. Clay lift thickness (yd) _____ (0.22 yd; p. 7-12)

WORKSHEET B-10 (page 3)

k. Number of lifts
Line 3b ÷ Line 3j _____

l. Number of samples to be tested/lift (samples/lift) _____ (3 samples/lift; p. 7-12)

m. Number of samples to be tested
Line 3k x Line 3l _____

n. Clay testing unit cost ($/sample) _____ ($230/sample; p. 7-12)

o. Clay testing cost
Line 3m x Line 3n _____

p. Off-site clay cost ($)
Line 3c x Line 3n x (1 + Line 3i) + Line 3o _____

4. Synthetic Membrane

a. Type of membrane _____

b. Quantity needed (yd^2) _____

c. Purchase unit cost ($/$yd^2$) _____ ($2.60/yd^2; p. 7-16)

d. Delivery unit cost ($/$yd^2$) _____ ($0.25/yd^2; p. 7-16)

e. Installation unit cost ($/$yd^2$) _____ ($0.50/yd^2; p. 7-16)

f. Total synthetic membrane unit cost ($/$yd^2$)
Line 4c + Line 4d + Line 4e _____ ($3.35/$yd^2$; p. 7-16)

g. Synthetic liner testing (percent of total synthetic membrane unit cost) _____ (0.25; p. 7-15)

h. Synthetic membrane cost ($)
Line 4b x Line 4f x (1 + Line 4g) _____

5. Sand

a. Area to be capped (yd^2)
Line 1a x Line 1b _____

b. Deptn of sand needed (yd) _____ (0.33 yd; p. 7-4)

WORKSHEET B-10 (page 4)

c. Quantity needed (yd^3)
Line 5a x Line 5b _____

d. Purchase unit cost ($/$yd^3$) _____ ($5.50/yd^3; p. 7-20)

e. Delivery unit cost ($/$yd^3$) _____ ($2.61/yd^3; p. 7-20)

f. Spreading unit cost ($/$yd^3$) _____ ($1.03/yd^3; p. 7-20)

g. Compaction unit cost ($/$yd^3$) _____ ($1.49/yd^3; p. 7-20)

h. Total sand unit cost ($/$yd^3$)
Line 5d + Line 5e + Line 5f
+ Line 5g _____ ($10.63/$yd^3$; pp. 7-20 - 7-21)

i. Percent compaction (decimal < 1) _____ (0.10; p. 7-10)

j. Sand cost ($)
Line 5c x Line 5h x (1 + Line 5i) _____

6. Gravel

a. Area to be capped (yd^2)
Line 1a x Line 1b _____

b. Depth of gravel needed (yd) _____ (0.33 yd; p. 7-4)

c. Quantity needed (yd^3)
Line 6a x Line 6b _____

d. Purchase unit cost ($/$yd^3$) _____ ($8.85/yd^3; p. 7-17)

e. Delivery unit cost ($/$yd^3$) _____ ($2.61/yd^3; p. 7-17)

f. Spreading unit cost ($/$yd^3$) _____ ($1.03/yd^3; p. 7-17)

g. Compaction unit cost ($/$yd^3$) _____ ($1.22/yd^3; p. 7-17)

h. Total gravel unit cost ($/$yd^3$)
Line 6d + Line 6e + Line 6f
+ Line 6g _____ ($8.71/$yd^3$; pp. 7-17 - 7-18)

i. Percent compaction (decimal < 1) _____ (0.05; p. 7-10)

j. Gravel cost ($)
Line 6c x Line 6h x (1 + Line 6i) _____

WORKSHEET B-10 (page 5)

7. Drainage Tile

a. Type of tile _____

b. Length needed (L.F.) _____

c. Tile unit cost ($/L.F.) _____ ($0.50/L.F.; p. 7-22)

d. Trenching and backfilling unit cost ($/L.F.) _____ ($0.56/L.F.; p. 7-22)

e. Total drainage tile unit cost ($/L.F.)
Line 7c + Line 7d _____ ($1.06/L.F.; pp. 7-22 - 7-23)

f. Drainage tile cost ($)
Line 7b x Line 7e _____

8. Geotextile Filter Fabric

a. Type of geotextile _____

b. Quantity needed (yd^2) _____

c. Purchase unit cost ($/$yd^2$) _____ ($0.69/yd^2; p. 7-24)

d. Delivery unit cost ($/$yd^2$) _____ ($0.05/yd^2; p. 7-24)

e. Installation unit cost ($/$yd^2$) _____ ($0.09/yd^2; p. 7-24)

f. Total geotextile filter fabric unit cost ($/$yd^2$)
Line 8c + Line 8d + Line 8e _____ ($0.83/$yd^2$; p. 7-24)

g. Geotextile filter fabric cost ($)
Line 8b x Line 8f _____

9. Topsoil

a. Area to be capped (yd^2)
Line 1a x Line 1b _____

b. Depth of topsoil needed (yd) _____ (0.67 yd; p. 7-4)

c. Quantity needed (yd^3)
Line 9a x Line 9b _____

d. Purchase unit cost ($/$yd^3$) _____ ($6.56/yd^3; p. 7-26)

e. Delivery unit cost ($/$yd^3$) _____ ($2.61/yd^3; p. 7-26)

WORKSHEET B-10 (page 6)

f. Spreading unit cost ($/yd^3) _____ ($1.03/yd^3; p. 7-26)

g. Compaction unit cost ($/yd^3) _____ ($1.22/yd^3; p. 7-26)

h. Total topsoil unit cost ($/yd^3)
Line 9d + Line 9e + Line 9f + Line 9g _____ ($11.42/yd^3; pp. 7-26 - 7-27)

i. Percent compaction (decimal < 1) _____ (0.25; p. 7-10)

j. Topsoil cost ($)
Line 9c x Line 9h x (1 + Line 9i) _____

10. Crushed Stone

a. Area to be capped (yd^2)
Line 1a x Line 1b _____

b. Depth of crushed stone needed (yd) _____ (0.33 yd; p. 7-4)

c. Quantity needed (yd^3)
Line 10a x Line 10b _____

d. Purchase unit cost ($/yd^3) _____ ($11.55/yd^3; p. 7-28)

e. Delivery unit cost ($/yd^3) _____ ($2.61/yd^3; p. 7-28)

f. Spreading unit cost ($/yd^3) _____ ($1.03/yd^3; p. 7-28)

g. Compaction unit cost ($/yd^3) _____ ($1.22/yd^3; p. 7-28)

h. Total crushed stone unit cost ($/yd^3)
Line 10d + Line 10e + Line 10f + Line 10g _____ ($16.41/yd^3; pp. 7-28 - 7-29)

i. Percent compaction (decimal < 1) _____ (0.05; p. 7-10)

j. Crushed stone cost ($)
Line 10c x Line 10h x (1 + Line 10i) _____

11. Mobilization/Demobilization

a. Heavy equipment mobilization/ demobilization cost ($) _____ ($700; p. 7-32)

12. Final Cover Subtotal ($)
Line 1i + Line 2c + Line 3p + Line 4n + Line 5j + Line 6j + Line 7f + Line 8g + Line 9j + Line 10j + Line 11a _____

WORKSHEET 6-11

Revegetation

1. Soil Preparation and Grading

   a. Area to be revegetated, including closed area that needs replanting (acres) _____

   b. Soil preparation and grading unit cost ($/acre) _____ ($1002/acre; p. 7-31)

   c. Soil preparation and grading cost ($)
   Line 1a x Line 1b _____

2. Seeding

   a. Type of vegetation _____

   b. Seed unit cost ($/acre) _____ ($795/acre; p. 7-31)

   c. Seed cost ($)
   Line 1a x Line 2b _____

3. Fertilizing

   a. Type of fertilizer _____

   b. Fertilizer unit cost ($/acre) _____ ($176/acre; p. 7-31)

   c. Fertilizing cost ($)
   Line 1a x Line 3b _____

4. Mulching

   a. Mulch unit cost ($/acre) _____ ($1048/acre; p. 7-31)

   b. Mulching cost ($)
   Line 1a x Line 4a _____

5. Mobilization/Demobilization

   a. Heavy equipment mobilization/demobilization cost ($) _____ ($105; p. 7-32)

6. **Revegetation Subtotal ($)**
   Line 1c + Line 2c + Line 3c + Line 4b + Line 5a | | |

WORKSHEET B-12

Groundwater Monitoring Well Construction

1. Number of Groundwater Monitoring Wells

   a. Total number of wells to be constructed _____

2. Depth

a. Well number	1	2	3	4	5	6	7	8
b. Well depth (ft)								
c. Length of screen (ft)								
d. Length of casing (ft) Line 2b - Line 2c								

a. Well number	9	10	11	12	13	14	15	SUM
b. Well depth(ft)								
c. Length of screen (ft)								
d. Length of casing (ft) Line 2b - Line 2c								

3. Materials

   a. Total length of casing (ft) Line 2d SUM _____

   b. Casing unit cost ($/ft) _____ ($9 ft; p. 3-5)

   c. Casing cost ($) Line 3a x Line 3b _____

   d. Well screen unit cost ($/ea) _____ ($290/ea; p. 3-5)

   e. Well screen cost ($) Line 1a x Line 3d _____

   f. Pump unit cost ($/ea) _____ ($495/ea; p. 3-5)

WORKSHEET B-12 (page 2)

g. Pump cost ($)
Line 1a x Line 3f _____

h. Tubing unit cost ($/ft) _____ ($2.75/ft; p. 3-5)

i. Tubing cost ($)
Line 3a x Line 3h _____

j. Well cap unit cost ($/ea) _____ ($70/ea; p. 3-5)

k. Well cap cost ($)
Line 1a x Line 3j _____

l. Materials cost
Line 3c + Line 3e + Line 3g +
Line 3i + Line 3k _____

4. Installation

a. Total depth of wells (ft)
Line 2b SUM _____

b. Drilling unit cost ($/ft) _____ ($22/ft; p. 3-5)

c. Drilling cost ($)
Line 4a x Line 4b _____

d. Mobilization/demobilization ($) _____ ($150; p. 3-5)

e. Installation cost
Line 4c + Line 4d _____

5. Groundwater Monitoring Well Construction
Subtotal ($)

Line 3l + Line 4e _____

WORKSHEET B-13, PART 264 ONLY

Groundwater Monitoring

1. Detection Monitoring - Background/ Upgradient Wells

a. Number of wells _____

b. Number of samples collected per well (samples/well) _____

c. Number of replicate analyses per sample (replicates/sample) _____

d. Number of analyses
Line 1a x Line 1b x Line 1c _____ (minimum of 4)

e. Sample collection and preparation time required (hrs/well) _____ (4 hrs/well; p. 2-9)

f. Transportation time to and from site (hrs) _____

g. Contract lab technician unit labor cost ($/hr) _____ ($20.50/hr; p. 9-3)

h. Sample collection time (hrs)
(Line 1a x Line 1e) + Line 1f _____

i. Sampling cost ($)
Line 1g x Line 1h _____

j. Contract lab fee ($/analysis) _____ (p. 2-10)

k. Contract lab cost ($)
Line 1d x Line 1j _____

l. Number of times upgradient detection monitoring samples are collected during closure _____ (quarterly for one year; p. 2-3)

m. Upgradient/background detection monitoring cost ($)
(Line 1i + Line 1k) x Line 1l _____

WORKSHEET B-13, PART 264 ONLY (page 2)

2. Compliance Monitoring - Background/ Upgradient Wells

   a. Number of wells _____

   b. Number of samples collected per well (samples/well) _____

   c. Number of replicate analyses per sample (replicates/sample) _____

   d. Number of analyses Line 2a x Line 2b x Line 2c _____ (minimum of 4)

   e. Sample collection and preparation time required (hrs/well) _____ (4 hrs/well; p. 2-9)

   f. Transportation time to and from site (hrs) _____

   g. Contract lab technician unit labor cost ($/hr) _____ ($20.50/hr; p. 9-3)

   h. Sample collection time (hrs) (Line 2a x Line 2e) + Line 2f _____

   i. Sampling cost ($) Line 2g x Line 2h _____

   j. Contract lab fee ($/analysis) _____ (p. 2-10)

   k. Contract lab cost ($) Line 2d x Line 2j _____

   l. Number of times upgradient compliance monitoring samples are collected during closure _____ (quarterly for one year; p. 2-4)

   m. Upgradient/background compliance monitoring cost ($) (Line 2i + Line 2k) x Line 2l _____

3. Administrative (Reporting)

   a. Number of analyses (Line 1d x Line 1l) + (Line 2d x Line 2l) + _____

WORKSHEET B-13, PART 264 ONLY (page 3)

b. Contract lab technician time required (hrs/analysis) _____

c. Contract lab technician unit labor cost ($/hr) _____ ($20.50/hr; p. 9-3)

d. Technician cost ($)
Line 3a x Line 3b x Line 3c _____

e. Clerical time required (hrs/analysis) _____

f. Clerical unit labor cost ($/hr) _____ ($18/hr; p. 9-3)

g. Clerical cost ($)
Line 3a x Line 3e x Line 3f _____

h. Administration subtotal ($)
Line 3d + Line 3g _____

4. Monitoring Well Maintenance

a. Total number of wells _____

b. Maintenance time required (hrs/well) _____

c. Unit labor cost ($/hr) _____ ($23/hr; p. 9-3

d. Monitoring well maintenance cost ($)
Line 4a x Line 4b x Line 4c _____

5. Groundwater Monitoring Subtotal ($)
Line 1m + Line 2m + Line 3h + Line 4d _____

WORKSHEET B-13, PART 265 ONLY

Groundwater Monitoring

1. Primary Drinking Water Parameters Analysis - Background/Upgradient and Downgradient Wells

a. Number of wells _____ (minimum of 4; p. 2-1)

b. Number of samples collected per well (samples/well) _____

c. Number of replicate analyses per sample (replicates/sample) _____

d. Number of analyses Line 1a x Line 1b x Line 1c _____

e. Sample collection and preparation time required (hrs/well) _____ (4 hrs/well; p. 2-4)

f. Transportation time to and from site (hrs) _____

g. Contract lab technician unit labor cost ($/hr) _____ ($20.50/hr; p. 9-3)

h. Sample collection time (hrs) (Line 1a x Line 1e) + Line 1f _____

i. Sampling cost ($) Line 1g x Line 1h _____

j. Contract lab fee ($/analysis) _____ ($585/analysis; p. 2-8)

k. Contract lab cost ($) Line 1d x Line 1j _____

l. Number of times background drinking water samples are collected during closure _____ (quarterly for one year; p. 2-2)

m. Background drinking water parameters cost ($) (Line 1i + Line 1k) x Line 1l _____

WORKSHEET B-13, PART 265 ONLY (page 2)

2. Groundwater Quality Analysis - Background/ Upgradient and Downgradient Wells

a. Number of wells _____ (minimum of 4; p. 2-1)

b. Number of samples collected per well (samples/well) _____

c. Number of replicate analyses per sample (replicates/samples) _____

d. Number of analyses Line 2a x Line 2b x Line 2c _____

e. Sample collection and preparation time required (nrs/well) _____ (4 nrs/well; p. 2-4)

f. Transportation time to and from site (nrs) _____

g. Contract lab technician unit labor cost ($/nr) _____ ($20.50/hr; p. 9-3)

h. Sample collection time (nrs) (Line 2a x Line 2e) + Line 2f _____

i. Sampling cost ($) Line 2g x Line 2h _____

j. Contract lab fee ($/analysis) _____ ($86/analysis; p. 2-5)

k. Contract lab cost ($) Line 2d x Line 2j _____

l. Number of times background groundwater contamination samples are collected during closure _____ (quarterly for one year; p. 2-2)

m. Background groundwater contamination sampling cost ($) (Line 2i + Line 2k) x Line 2l _____

WORKSHEET B-13, PART 265 ONLY (page 3)

3. Groundwater Contamination Analysis - Background/Upgradient and Downgradient Wells

a. Number of wells _____ (minimum of 4; p. 2-1)

b. Number of samples collected per well (samples/well) _____

c. Number of replicate analyses per sample (replicates/samples) _____ (4 replicates/sample; p. 2-2)

d. Number of analyses
Line 3a x Line 3b x Line 3c _____

e. Sample collection and preparation time required (hrs/well) _____ (4 hrs/well; p. 2-6)

f. Transportation time to and from site (hrs) _____

g. Contract lab technician unit labor cost ($/hr) _____ ($20.50/hr; p. 9-3)

h. Sample collection time (hrs)
(Line 3a x Line 3e) + Line 3f _____

i. Sampling cost ($)
Line 3g x Line 3h _____

j. Contract lab fee ($/analysis) _____ ($120/analysis; p. 2-7)

k. Contract lab cost ($)
Line 3d x Line 3j _____

l. Number of times background groundwater contamination samples are collected during closure _____ (quarterly for one year; p. 2-2)

m. Background groundwater contamination sampling cost ($)
(Line 3i + Line 3k) x Line 3l _____

WORKSHEET B-13, PART 265 ONLY (page 4)

4. Administrative (Reporting)

a. Total number of analyses
(Line 1d x Line 1l) +
(Line 2d x Line 2l) +
(Line 3d x Line 3l) _____

b. Contract lab technician time
required (hrs/analysis) _____

c. Technician unit labor cost ($/hr) _____ ($20.50/hr; p. 9-3)

d. Technician cost ($)
Line 4a x Line 4b x Line 4c _____

e. Clerical time required
(hrs/set of analysis) _____

f. Clerical unit labor cost ($/hr) _____ ($18/hr; p. 9-3)

g. Clerical cost ($)
Line 4a x Line 4e x Line 4f _____

h. Administration subtotal ($)
Line 4c + Line 4g _____

5. Monitoring well Maintenance

a. Total number of wells _____

b. Maintenance time required
(hrs/well) _____

c. Unit labor cost ($/hr) _____ ($23/hr; p. 9-3)

d. Monitoring well maintenance cost ($)
Line 5a x Line 5b x Line 5c _____

6. Background Groundwater Monitoring
Subtotal ($)
Line 1m + Line 2m + Line 3m +
Line 4n + Line 5d _____

WORKSHEET B-14

Survey Plat - Final Closure

1. Surveying of Waste Management Area Boundaries

   a. Land surveying team time required (hrs) _____

   b. Land surveying team unit labor cost ($/hr) _____ ($75/hr; p. 9-3)

   c. Land surveying cost ($) Line 1a x Line 1b _____

2. Fence Posts to Mark Boundaries

   a. Number of fence posts _____

   b. Fence post unit cost ($/post) _____ ($29/post; p. 3-7)

   c. Fence post cost ($) Line 2a x Line 2b _____

3. Plat Submittal

   a. Attorney time required (hrs) _____

   b. Attorney unit labor cost ($/hr) _____ ($100/hr; p. 9-3)

   c. Attorney cost ($) Line 3a x Line 3b _____

   d. Clerical time required (hrs) _____

   e. Clerical unit labor cost ($/hr) _____ ($18/hr; p. 9-3)

   f. Clerical cost ($) Line 3d x Line 3e _____

   g. Plat submittal cost ($) Line 3c + Line 3f _____

4. Notice to Local Land Authority Subtotal ($) Line 1c + Line 2c + Line 3g [ ]

CHAPTER 4

INCINERATION

This chapter contains the worksheets for estimating Part 264 or Part 265 closure costs for incinerators. Applicable sections of Worksheets C-1 through C-4 apply to all incinerators. Worksheet C-5 will be applicable if there is contaminated soil at the facility. Worksheet C-6 will be applicable only if closure of the incinerator results in final closure of the entire TSDF. The incineration worksheets address the following items:

- Inventory Management

  1. Inventory quantity (maximum)
  2. On-site treatment of liquid waste inventory
  3. Treated waste discharge to sewer
  4. Incineration of inventory and/or treatment residue
  5. Inspections during incinerator operation
  6. Containerization of bulk waste
  7. Container loading
  8. Off-site management of inventory, ash, and/or treatment residue
  9. On-site disposal

- Air Quality Monitoring

  1. Administration (reporting)
  2. Sampling and analysis of waste exhaust emissions

- Decontamination

  1. Protective clothing and safety equipment for facility personnel
  2. Equipment decontamination
  3. Tank decontamination
  4. Pad or foundation decontamination

5. Sump decontamination
6. Incinerator refractory removal
7. Container rinsing
8. Other items needing decontamination
9. On-site treatment of decontamination residues
10. Testing for success of decontamination
11. Treated residue discharge to sewer
12. Off-site management of incinerator refractory, decontamination fluid/residue, and/or treatment residue
13. On-site disposal

- Testing for Soil Contamination

1. Background samples and samples with potential contamination
2. Preparation of isogram plan

- Removal of Contaminated Soil

1. Protective clothing
2. Excavation of contaminated soil and earthen berms
3. Equipment decontamination
4. On-site treatment of decontamination residues
5. Treated residue discharge to sewer
6. Off-site management of contaminated soil, decontamination residue, and/or treatment residue
7. On-site disposal

- Certification of Final Closure

1. Independent registered professional engineer
2. Clerical

WORKSHEET C-1

Inventory Management

1. Inventory Quantity (Maximum)*

   a. Incinerator inventory (tons) _____

   b. Sludge/residue from surface impoundment(s) (tons) _____

   c. Inventory from waste pile(s) (tons) _____

   d. Inventory from containers (tons) _____

   e. Inventory from tank storage (tons) _____

   f. Inventory from treatment tanks (tons) _____

   g. Free liquid from surface impoundment(s) (tons) _____

   h. Inventory from landfill (tons) _____

   i. Inventory from land treatment (tons) _____

   j. Leachate and/or run-off from landfill (tons) _____

   k. Leachate and/or run-off from waste pile(s) (tons) _____

   l. Decontamination fluid/residue (tons) _____

   m. Leachate and/or run-off from surface impoundment(s) (tons) _____

   n. Residues from treatment of waste inventory, decontamination fluid, and/or leachate (tons) _____

   o. Contaminated soil (tons) _____

   p. Other (tons) _____

   q. Run-on/run-off from land treatment (tons) _____

* Conversion factors are provided in the Volume III appendix.

WORKSHEET C-1 (page 2)

r. Total inventory (tons)
Line 1a + Line 1b + Line 1c +
Line 1d + Line 1e + Line 1f +
Line 1g + Line 1h + Line 1i +
Line 1j + Line 1k + Line 1l +
Line 1m + Line 1n + Line 1o +
Line 1p + Line 1q _____

2. On-Site Treatment of Liquid Waste Inventory

a. Quantity of waste to be treated (gal) _____

b. Chemicals required for treatment (lb/gal waste or gal/gal waste) _____ (pp. 4-12 - 4-13)

c. Chemicals unit cost ($/lb or $/gal) _____

d. Chemicals cost ($)
Line 2a x Line 2b x Line 2c _____

e. Electricity required for treatment (kwh/gal waste) _____ (pp. 4-12 - 4-13)

f. Electricity unit cost ($/kwh) _____ ($0.05/kwh; p. 4-2)

g. Electricity cost ($)
Line 2a x Line 2e x Line 2f _____

h. Water required for treatment (gal/gal waste) _____ (pp. 4-12 - 4-13)

i. Water unit cost ($/1000 gal) _____ ($1.22/1000 gal; p. 4-2)

j. Water cost ($)
[(Line 2a x Line 2h) ÷ 1000]
x Line 2i _____

k. Fuel required for treatment (MMBtu/gal waste) _____ (pp. 4-12 - 4-13)

l. Fuel unit cost ($/MMBtu) _____ (p. 4-2)

m. Fuel cost ($)
Line 2a x Line 2k x Line 2l _____

n. Labor required for treatment (hrs/gallon waste) _____ (pp. 4-12 - 4-13)

o. Process operator unit labor cost ($/hr) _____ ($26.50/hr; p. 9-3)

WORKSHEET C-1 (page 3)

p. Labor cost ($)
Line 2a x Line 2n x Line 2o _____

q. On-site treatment cost ($)
Line 2d + Line 2g + Line 2j +
Line 2m + Line 2p _____

r. Residue generated from treatment
(gal) _____

3. Treated Waste Discharge to Sewer

a. Volume of liquid discharged (gal) _____

b. Sewer discharge unit cost
($/1000 gal) _____ ($1.50/1000 gal;
p. 4-2)

c. Sewer discharge cost ($)
(Line 3a ÷ 1000) x Line 3b _____

4. Incineration of Inventory and/or
Treatment Residue

a. Operating time required (hrs) _____

b. Process operator unit labor
cost ($/hr) _____ ($26.50/hr; p. 9-3)

c. Type of auxiliary fuel used _____

d. Auxiliary fuel required (MMBtu/hr) _____

e. Auxiliary fuel unit cost ($/MMBtu) _____ ($5.16/MMBtu; p. 4-2)

f. Auxiliary fuel cost ($/hr)
Line 4d x Line 4e _____

g. Electricity required (kwh) _____

h. Electricity unit cost ($/kWh) _____ ($0.05/kWh; p. 4-2)

i. Electricity cost ($)
Line 4g x Line 4h _____

j. Lime required (lb/hr) _____

k. Lime unit cost ($/ton) _____ ($48/ton; p. 4-2)

l. Lime cost ($/hr)
Line 4j x (Line 4k ÷ 2000) _____

WORKSHEET C-1 (page 4)

m. Operating costs ($/hr)
Line 4b + Line 4f + Line 4l _____

n. Incineration cost ($)
(Line 4a x Line 4m) + Line 4i _____

o. Quantity of waste incinerated (tons) _____

p. Ash generation rate (tons/ton of waste) _____ (p. 4-12)

q. Ash quantity (tons)
Line 4o x Line 4p _____

5. Inspections During Incinerator Operation

a. Operating time per day (hrs/day) _____

b. Operating time required (days)
Line 4a ÷ Line 5a
(round up to nearest integer) _____

c. Days of operation per week
(days/week) _____

d. Operating time required (weeks)
Line 5b ÷ Line 5c
(round up to nearest integer) _____

e. Time required to inspect incinerator and associated equipment (hrs/day) _____

f. Time required to inspect waste feed cut-off (hr/wk) _____

g. Total time required for inspections (hrs)
(Line 5b x Line 5e) +
(Line 5d x Line 5f) _____

h. Process operator unit labor cost ($/hr) _____ ($26.50/hr p. 9-3)

i. Inspection cost ($)
Line 5g x Line 5h _____

6. Containerization of Bulk Waste

a. Quantity of waste to be containerized (gal) _____*

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* Conversion factors are provided in the Volume III appendix.
** Based on a 250-mile one-way distance.

WORKSHEET C-1 (page 5)

b. Container capacity (gal/container) _____ (55 gal/container; p. 4-6)

c. Number of containers needed
Line 6a ÷ Line 6b _____

d. Containerization unit cost
($/container) _____ (pp. 4-6 and 4-8)

e. Containerization cost ($)
Line 6c * Line 6d _____

7. Container Loading

a. Number of pallets
Line 6c ÷ 4
(round up to nearest interger) _____

b. Loading unit cost
($/pallet) _____ ($4.66/pallet; p.4-8)

c. Container loading cost ($)
Line 7a x Line 7b _____

8. Off-Site Management of Inventory, Asn, and/or Treatment Residue

a. Quantity to be managed off-site
(tons) _____*

b. Off-site management method _____

c. Transportation unit cost ($/mi) _____ ($4.50/mi; p. 4-15)**

d. One-way distance (mi/load) _____

e. Truck capacity (tons) _____

f. Number of loads
Line 8a ÷ Line 8e
(round up to nearest interger) _____

g. Transportation cost ($)
Line 8c x Line 8d x Line 8f _____

h. Off-site management unit cost
($/ton) _____ (pp. 4-13 - 4-20)

i. Off-site management cost ($)
Line 8g + (Line 8a x Line 8h) _____

---

* Conversion factors are provided in the Volume III appendix.
** Based on a 250-mile one-way distance.

WORKSHEET C-1 (page 6)

9. On-Site Disposal

   Include volume on one or more worksheets:
   Landfill Inventory - Line 1j, Line 1k, Line 1p
   Land Treatment Inventory - Line 1g, Line 1o

10. Incinerator Inventory Management Subtotal ($)
    Line 2q + Line 3c + Line 4n + Line 5i +
    Line 6e + Line 7c + + Line 8i

WORKSHEET C-2

Air Quality Monitoring

1. Administration (Reporting)

   a. Inventory incineration time required (hrs)
      See Incinerator Inventory Worksheet - Line 2a _____

   b. Inventory incineration time required (days)
      Line 2a ÷ 24 _____

   c. Air monitoring data reporting time required (hrs/day) _____

   c. Technician time required (hrs)
      Line 1b x Line 1c _____

   e. Technician unit labor cost ($/hr) _____ ($20.50/hr; p. 9-3)

   f. Technician cost ($)
      Line 1d x Line 1e _____

   g. Clerical time required (hrs) _____

   h. Clerical unit labor cost ($/hr) _____ ($18/hr; p. 9-3)

   i. Clerical cost ($)
      Line 1g x Line 1h _____

   j. Administration subtotal ($)
      Line 1f + Line 1i _____

2. Sampling and analysis of waste exhaust emissions ($) _____ (p. 2-19)

3. Air Quality Monitoring Subtotal ($)
   Line 1j + Line 2 _____

WORKSHEET C-3

Decontamination

1. Protective Clothing and Safety Equipment for Facility Personnel

   a. Number of personnel requiring protective clothing and safety equipment for decontamination _____

   b. Safety equipment and protective clothing unit cost ($/person) _____ ($80/person; p. 5-6)

   c. Safety equipment and protective clothing cost ($)
   Line 1a x Line 1b _____

2. Equipment Decontamination

   a. Equipment needing decontamination:

   - pumps and feed lines
   - heavy equipment (e.g., fork lifts, dozers, etc.)
   - other equipment (list)_____

   _____

   b. Number of pumps and lines _____

   c. Pumps and lines decontamination cost ($) _____(p. 5-4)

   d. Residual generation rate for pump and line decontamination _____(50 gal/pump and line; p. 5-1)

   e. Residual generated from pump and line decontamination (gal)
   Line 2b x Line 2d _____

   f. Heavy equipment decontamination cost ($) _____(p. 5-2)

   g. Total heavy equipment decontamination time (hrs) _____(p. 5-2)

   h. Residual generation rate for heavy equipment decontamination (gal/hr) _____(100 gal/hr; p. 5-1)

WORKSHEET C-3 (page 2)

i. Residual generated from heavy equipment decontamination (gal)
Line 2g x Line 2h _____

j. Equipment decontamination cost ($)
Line 2c + Line 2f _____

k. Contaminated fluid and/or residues generated (gal)
Line 2e + Line 2i _____

3. Tank Decontamination

a. Number of personnel entering tanks _____

b. Additional personnel safety equipment unit cost ($/person) _____ ($172/person; p. 5-6)

c. Additional personnel safety equipment cost ($)
Line 3a x Line 3b _____

d. Method of tank decontamination _____

e. Tank area to be decontaminated (ft^2) _____

f. Tank decontamination unit cost ($/$ft^2$) _____ (p. 5-3)

g. Tank decontamination cost ($)
Line 3e x Line 3f _____

h. Tank decontamination subtotal before surcharge ($)
Line 3c + Line 3g _____

i. Surcharge factor (factor ≥ 1) _____ (2.0; p. 5-6)

j. Tank decontamination subtotal ($)
Line 3h x (1 + Line 3i) _____

k. Volume of tank(s) to be filled with sand (gal) _____

WORKSHEET C-3 (page 3)

l. Sand purchase and placement unit cost ($/gal) _____ ($0.10/gal; p. 5-7)

m. Tank decontamination and sand filling cost ($)
Line 3j + (Line 3k x Line 3l) _____

n. Residual generation rate for tank decontamination (gal/ft^2) _____ (p. 5-3)

o. Contaminated fluid and/or residues generated (gal)
Line 3e x Line 3n _____

4. Pad or Foundation Decontamination

a. Method of pad decontamination _____

b. Pad area to be decontaminated (ft^2) _____

c. Pad decontamination unit cost ($/$ft^2$) _____ (p. 5-3)

d. Pad decontamination subtotal ($)
Line 4b x Line 4c _____

e. Residual generation rate for pad/foundation decontamination (gal/ft^2) _____ (p. 5-3)

f. Contaminated fluid and/or residues generated (gal)
Line 4b x Line 4e _____

5. Sump Decontamination

a. Method of sump decontamination _____

b. Volume to be pumped from sump(s) (gal) _____

c. Time required for pumping (hrs)
Line 5b ÷ 8000
(round up to nearest integer) _____

d. Pumping unit cost ($/hr) _____ ($23/hr; p. 4-11)

WORKSHEET C-3 (page 4)

e. Pump rental cost, optional ($/hr) _____ ($2.70/hr; p. 4-11)

f. Pumping cost ($)
(Line 5c x Line 5d) + Line 5e _____

g. Sump area to be decontaminated (ft^2) _____

h. Sump decontamination unit cost ($/$ft^2$) _____ (p. 5-3)

i. Sump decontamination cost ($)
Line 5g x Line 5h _____

j. Sump decontamination subtotal ($)
Line 5f + Line 5i _____

k. Residual generation rate for sump decontamination (gal/ft^2) _____ (p. 5-3)

l. Contaminated fluid and/or residues generated (gal)
Line 5b + (Line 5g x Line 5k) _____

6. Incinerator Refractory Removal

a. Area of incinerator refractory (ft^2) _____

b. Refractory removal unit cost ($/$ft^2$) _____ ($3.20/ft^2; p. 5-10)

c. Refractory removal cost ($)
Line 6a x Line 6b _____

d. Refractory weight (lb/ft^2) _____ (33 lb/ft^2; p. 5-10)

e. Amount of refractory needing disposal (tons)
(Line 6a x Line 6d) ÷ 2000 _____

7. Container Rinsing

a. Number of containers _____

b. Container rinsing time required (hrs)
0.083 x Line 7a _____

WORKSHEET C-3 (page 5)

c. Container rinsing unit cost ($/hr) _____ ($32.75/hr; p. 5-10)

d. Container rinsing subtotal ($)
Line 7b x Line 7c _____

e. Residual generation rate for container rinsing (gal/drum) _____ (10 gal/drum; p. 5-10)

f. Contaminated fluid/residual generated (gal)
Line 7a x Line 7e _____

8. Other Items Needing Decontamination

a. List items _____

_____

b. Method of decontamination for other items _____

c. Surface area of items to be decontaminated (ft^2) _____

d. Decontamination unit cost ($/$ft^2$) _____ (p. 5-3)

e. Decontamination of other items subtotal ($)
Line 8c x Line 8d _____

f. Residual generation rate for decontamination of other items (gal/ft^2) _____ (p. 5-3)

g. Contaminated fluid and/or residues generated (gal)
Line 8c x Line 8f _____

9. On-Site Treatment of Decontamination Residues

a. Quantity of residue to be treated (gal) _____

b. Chemicals required for treatment (lb/gal residue or gal/gal residue) _____ (pp. 4-12 - 4-13)

c. Chemicals unit cost ($/lb or $/gal) _____

d. Chemicals cost ($)
Line 9a x Line 9b x Line 9c _____

WORKSHEET C-3 (page 6)

e. Electricity required for treatment (kwh/gal residue) _____ (pp. 4-12 - 4-13)

f. Electricity unit cost ($/kwh) _____ ($0.05/kwh; p. 4-2)

g. Electricity cost ($)
Line 9a x Line 9e x Line 9f _____

h. Water required for treatment (gal/gal residue) _____ (pp. 4-12 - 4-13)

i. Water unit cost ($/1000 gal) _____ ($1.22/1000 gal; p. 4-2)

j. Water cost ($)
[(Line 9a x Line 9h) ÷ 1000] x Line 9i _____

k. Fuel required for treatment (MMBtu/gal residue) _____ (pp. 4-12 - 4-13)

l. Fuel unit cost ($/MMBtu) _____ (p. 4-2)

m. Fuel cost ($)
Line 9a x Line 9k x Line 9l _____

n. Labor required for treatment (hrs/gallon residue) _____ (pp. 4-12 - 4-13)

o. Process operator unit labor cost ($/hr) _____ ($26.50/hr; p. 9-3)

p. Labor cost ($)
Line 9a x Line 9n x Line 9o _____

q. On-site treatment cost ($)
Line 9d + Line 9g + Line 9j + Line 9m + Line 9p _____

r. Residue generated from treatment (gal) _____

10. Testing for Success of Decontamination

a. Number of samples _____

b. Sample collection time required (hrs/sample) _____

c. Technician unit labor cost ($/hr) _____ ($20.50/hr; p. 9-3)

WORKSHEET C-3 (page 7)

d. Sample collection time (hrs)
Line 10a x Line 10b _____

e. Sampling cost ($)
Line 10c x Line 10d _____

f. Cost to test each sample ($/sample) _____(pp. 5-10 - 5-11)

g. Testing cost ($)
Line 10a x Line 10f _____

h. Testing for success of decontamination
Line 10e + Line 10g _____

11. Treated Residue Discharge to Sewer

a. Volume of liquid discharged (gal) _____

b. Sewer discharge unit cost ($/1000 gal) _____($1.50/1000 gal; p. 4-2)

c. Sewer discharge cost ($)
(Line 11a ÷ 1000) x Line 11b _____

12. Off-Site Management of Incinerator Refractory, Decontamination Fluid/Residues, and/or Treatment Residue

a. Off-site management method_____

b. Quantity to be managed off-site (tons) _____*

c. Truck capacity (tons) _____

d. Number of loads
Line 12b ÷ Line 12c
(round up to nearest integer) _____

e. One-way distance (mi/load) _____

f. Transportation unit cost ($/mi) _____($4.50/mi; p. 4-15)**

g. Transportation cost ($)
Line 12d x Line 12e x Line 12f _____

---

* Conversion factors are provided in the Volume III appendix.
** Based on a 250-mile one-way distance.

WORKSHEET C-3 (page 8)

h. Off-site management unit cost ($/ton) _____ (pp. 4-13 - 4-20)

i. Off-site management cost ($)
Line 12b x Line 12h _____

j. Contaminated fluid and residue disposal subtotal ($)
Line 12g + Line 12i _____

13. On-Site Disposal

Include volume on one or more worksheets:
Landfill Inventory - Line 1n, Line 1p, Line 1q
Land Treatment Inventory - Line 1k, Line 1o

14. Facility Decontamination Subtotal ($)
Line 1c + Line 2j + Line 3m + Line 4d +
Line 5j + Line 6c + Line 7d + Line 8e +
Line 9a + Line 10n + Line 11c + Line 12j

WORKSHEET C-4

Testing for Soil Contamination

1. Background Samples and Samples with Potential Contamination

   a. Number of soil samples to be taken _____

   b. Number of samples requiring coring through concrete/asphalt foundations/pads _____

   c. Thickness of foundation/pad (inches) _____

   d. Unit cost for coring through/removing concrete/asphalt foundations/pads ($/sample) _____ ($15/inch; p. 6-1)

   e. Sample collection time required (hrs/sample) _____ (1 hr/sample; p. 2-12)

   f. Transportation time to and from site (hrs) _____

   g. Contract lab technician unit labor cost ($/hr) _____ ($20.50/hr; p. 9-3)

   h. Sample collection time (hrs)
   (Line 1a x Line 1e) + Line 1f _____

   i. Sampling cost ($)
   (Line 1b x Line 1c x Line 1d
   Line 1g x Line 1h) _____

   j. Contract lab fee ($/sample) _____ (p. 2-13)

   k. Contract lab cost ($)
   Line 1a x Line 1j _____

   l. Sample cost ($)
   Line 1i + Line 1k _____

2. Preparation of Isogram Plan

   a. Engineer time required (hrs) _____

   b. Engineer unit labor cost ($/hr) _____ ($45.50/hr; p. 9-3)

   c. Engineer cost ($)
   Line 2a x Line 2b _____

   d. Draftsperson time required (hrs) _____

   e. Draftsperson unit labor cost ($/hr) _____ ($24/hr; p. 9-3)

WORKSHEET C-4 (Page 2)

f. Draftsperson cost ($)
Line 2d x Line 2e _____

g. Clerical time required (hrs) _____

h. Clerical unit labor cost ($/hr) _____ ($18/hr; p. 9-3)

i. Clerical cost ($)
Line 2g x Line 2h _____

j. Isogram plan cost ($)
Line 2c + Line 2f + Line 2i _____

3. Soil Testing Subtotal ($)
Line 2l + Line 2j _____

WORKSHEET C-5

Removal of Contaminated Soil

1. Protective Clothing

   a. Number of personnel requiring protective clothing for excavation and decontaminating _____

   b. Protective clothing unit cost ($/person) _____ ($77/person; p. 6-8)

   c. Protective clothing cost ($)
   Line 1a x Line 1b _____

2. Excavation of Contaminated Soil and Bartner Berms

   a. Volume of contaminated soil/berms to be removed (yd^3) _____

   b. Excavation unit cost, including loading ($/$yd^3$) _____ (pp. 6-3 - 6-7)

   c. Mobilization/demobilization cost ($) _____ (pp. 4-5, 4-7, 4-10, and 6-3)

   d. Contaminated soil/berm removal cost before surcharge ($)
   (Line 2a x Line 2b) + Line 2c _____

   e. Surcharge factor _____ (1.0; pp. 6-8 - 6-9)

   f. Contaminated soil/berm removal subtotal ($)
   Line 2c x (1 + Line 2e) _____

3. Equipment Decontamination

   a. Total heavy equipment decontamination time (hrs) _____ (p. 5-2)

   b. Heavy equipment decontamination cost ($) _____ (p. 5-2)

   c. Residual generation rate for heavy equipment decontamination (gal/hr) _____ (100 gal/hr; p. 5-1)

   d. Contaminated fluid and/or residues generated (gal)
   Line 3a x Line 3c _____

WORKSHEET C-5 (page 2)

4. On-Site Treatment of Decontamination Residues

a. Quantity of residue to be treated (gal) _____

b. Chemicals required for treatment (lb/gal residue or gal/gal residue) _____ (pp. 4-12 - 4-13)

c. Chemicals unit cost ($/lb or $/gal) _____

d. Chemicals cost ($)
Line 4a x Line 4b x Line 4c _____

e. Electricity required for treatment (kwh/gal residue) _____ (pp. 4-12 - 4-13)

f. Electricity unit cost ($/kwh) _____ ($0.05/kwh; p. 4-2)

g. Electricity cost ($)
Line 4a x Line 4e x Line 4f _____

h. Water required for treatment (gal/gal residue) _____ (pp. 4-12 - 4-13)

i. Water unit cost ($/1000 gal) _____ ($1.22/1000 gal; p. 4-2)

j. Water cost ($)
(Line 4a x Line 4h) ÷ 1000
x Line 4i _____

k. Fuel required for treatment (MMBtu/gal residue) _____ (pp. 4-12 - 4-13)

l. Fuel unit cost ($/MMBtu) _____ (p. 4-2)

m. Fuel cost ($)
Line 4a x Line 4k x Line 4l _____

n. Labor required for treatment (hrs/gallon residue) _____ (pp. 4-12 - 4-13)

o. Process operator unit labor cost ($/hr) _____ ($26.50/hr; p. 9-3)

p. Labor cost ($)
Line 4a x Line 4n x Line 4o _____

WORKSHEET C-5 (page 3)

c. On-site treatment cost ($)
Line 4d + Line 4g + Line 4j +
Line 4m + Line 4p _____

r. Residue generated from treatment
(gal) _____

5. Treated Residue Discharge to Sewer

a. Volume of liquid discharged (gal) _____

b. Sewer discharge unit cost
($/1000 gal) _____ ($1.50/1000 gal;
p. 4-2)

c. Sewer discharge cost ($)
(Line 5a ÷ 1000) x Line 5b _____

6. Off-Site Management of Contaminated Soil, Decontamination Residue, and/or Treatment Residue

a. Quantity to be managed off-site
(tons) _____*

b. Truck capacity (tons) _____

c. Number of loads
Line 6a ÷ Line 6b
(round up to nearest integer) _____

d. One-way distance (mi/load) _____

e. Transportation unit cost ($/mi) _____ ($4.50/mi; p. 4-15)**

f. Transportation cost ($)
Line 6c x Line 6d x Line 6e _____

g. Off-site management unit
cost ($/ton) _____ (pp. 4-13 - 4-20)

h. Off-site management cost ($)
Line 6a x Line 6g _____

i. Off-site management subtotal ($)
Line 6f + Line 6h _____

---

* Conversion factors are provided in the Volume III appendix.
** Based on a 250-mile one-way distance.

WORKSHEET C-5 (page 4)

7. On-Site Disposal

Include volume on one or more worksheets:
Landfill Inventory - Line 1n, Line 1o, Line 1p
Incinerator Inventory - Line 1l, Line 1n, Line 1o
Land Treatment Inventory - Line 1k, Line 1l, Line 1o

8. Contaminated Soil Removal Subtotal ($)
Line 1c + Line 2f + Line 3b + Line 4q -
Line 5c + Line 6i

WORKSHEET C-6

Certification of Final Closure

1. Independent Registered Professional Engineer

   a. Initial review of closure plan (hrs) _____ (8 hrs; p. 8-4)

   b. Inspection frequency (inspections/wk) _____ (p. 8-3)

   c. Inspection time required (hrs/inspection) _____ (p. 8-3)

   d. Number of weeks for closure (wks) _____

   e. Inspection time required (hrs) Line 1b x Line 1c x Line 1d _____

   f. Prepare final documentation (hrs) _____ (4 hrs; p. 8-4)

   g. Total professional engineer time required (hrs) Line 1a + Line 1e + Line 1f _____

   h. Professional engineer unit labor cost ($/hr) _____ ($45.50/hr; p. 8-3)

   i. Professional engineer cost ($) Line 1g x Line 1h _____

2. Clerical*

   a. Clerical time required (hrs/wk) _____ (2 hrs/wk; p. 8-3)

   b. Clerical unit labor cost ($/hr) _____ ($18/hr; p. 8-3)

   c. Clerical cost ($) Line 1d x Line 2a x Line 2b _____

3. Certification of Closure Subtotal ($) Line 1i + Line 2c _____

* Clerical time should be included only if the Professional Engineer is operating independently in a single-person business.

CHAPTER 5

SUMMARY WORKSHEETS

This chapter contains the summary worksheets on which closure and post-closure costs for each technology can be added together to produce closure and post-closure cost estimates for the TSDF. These worksheets also include provision for reflecting regional cost differences, updating costs to current dollars, and including appropriate fees. The summary worksheets in this section are identical to those in Volume II, so if the user plans to use the summary worksheets in Volume II, these summary worksheets do not need to be used. The summary worksheets are as follows:

- Worksheet I-1 (Closure)
- Worksheet I-2 (Post-Closure)
- Worksheet I-3 (Contingent Closure)
- Worksheet I-4 (Contingent Post-Closure)

WORKSHEET I-1

Closure

1. Container Storage (Volume I)

   a. Inventory management cost ($)
      Worksheet A-1, Line 7 _____

   b. Testing for soil contamination
      cost ($)
      Worksheet A-2, Line 3 _____

   c. Decontamination cost ($)
      Worksheet A-3, Line 13 _____

   d. Foundation/pad removal
      cost ($)
      Worksheet A-4, Line 8 _____

   e. Removal of contaminated soil
      cost ($)
      Worksheet A-5, Line 8 _____

   f. Certification of final closure
      cost ($)
      Worksheet A-6, Line 3 _____

   g. Container storage subtotal ($)
      Line 1a + Line 1b + Line 1c +
      Line 1d + Line 1e + Line 1f _____

2. Treatment and Storage Tank (Volume I)

   a. Inventory management cost ($)
      Worksheet B-1, Line 9 _____

   b. Testing for soil contamination
      cost ($)
      Worksheet B-2, Line 3 _____

   c. Decontamination cost ($)
      Worksheet B-3, Line 14 _____

   d. Foundation/pad removal
      cost ($)
      Worksheet B-4, Line 8 _____

   e. Tank removal cost ($)
      Worksheet B-5, Line 7 _____

   f. Secondary containment system
      removal cost ($)
      Worksheet B-6, Line 9 _____

WORKSHEET I-1 (page 2)

g. Removal of contaminated soil cost ($)
Worksheet B-7, Line 8 _____

h. Certification of final closure cost ($)
Worksheet B-8, Line 3 _____

i. Treatment and storage tank subtotal ($)
Line 2a + Line 2b + Line 2c + Line 2d + Line 2e + Line 2f + Line 2g + Line 2h _____

3. Incineration (Volume I)

a. Inventory management cost ($)
Worksheet C-1, Line 10 _____

b. Air quality monitoring cost ($)
Worksheet C-2, Line 3 _____

c. Decontamination cost ($)
Worksheet C-3, Line 14 _____

d. Testing for soil contamination cost ($)
Worksheet C-4, Line 3 _____

e. Removal of contaminated soil cost ($)
Worksheet C-5, Line 8 _____

f. Certification of final closure cost ($)
Worksheet C-6, Line 3 _____

g. Incineration subtotal ($)
Line 3a + Line 3b + Line 3c + Line 3d + Line 3e + Line 3f _____

4. Waste Pile (Volume II)

a. Inventory management cost ($)
Worksheet D-1, Line 6 _____

b. Leachate and/or run-off management cost ($)
Worksheet D-2, Line 9 _____

WORKSHEET I-1 (page 3)

c. Part 264 groundwater monitoring cost ($)
Worksheet D-3, Line 8 _____

d. Part 265 groundwater monitoring cost ($)
Worksheet D-3, Line 5 _____

e. Testing for soil contamination cost ($)
worksheet D-4, Line 3 _____

f. Decontamination cost ($)
worksheet D-5, Line 13 _____

g. Foundation/pad removal cost ($)
Worksheet D-6, Line 8 _____

h. Containment/liner system removal cost ($)
Worksheet D-7, Line 6 _____

i. Removal of contaminated soil cost ($)
worksheet D-8, Line 9 _____

j. Certification of partial closure cost ($)
worksheet D-9, Line 3 _____

k. Certification of final closure cost ($)
worksheet D-10, Line 3 _____

l. Waste pile subtotal ($)
Line 4a + Line 4b + Line 4c + Line 4d + Line 4e + Line 4f + Line 4g + Line 4h + Line 4i + Line 4j + Line 4k _____

5. Surface Impoundment (Volume II)

a. Inventory management cost ($)
worksheet E-1, Line 12 _____

b. Leachate and/or run-off management cost ($)
Worksheet E-2, Line 9 _____

WORKSHEET I-1 (page 4)

c. Part 264 groundwater monitoring cost ($)
Worksheet E-3, Line 8 _____

d. Part 265 groundwater monitoring cost ($)
Worksheet E-3, Line 5 _____

e. Inspection and repairs cost ($)
Worksheet E-4, Line 4 _____

f. Testing for soil contamination cost ($)
Worksheet E-5, Line 3 _____

g. Decontamination cost ($)
Worksheet E-6, Line 10 _____

h. Removal of contaminated soil cost ($)
Worksheet E-7, Line 8 _____

i. Containment/liner system removal cost ($)
Worksheet E-8, Line 8 _____

j. Final cover cost ($)
Worksheet E-9, Line 12 _____

k. Revegetation cost ($)
Worksheet E-10, Line 6 _____

l. Certification of partial closures cost ($)
Worksheet E-11, Line 3 _____

m. Survey plat - partial closures cost ($)
Worksheet E-12, Line 4 _____

n. Certification of final closure cost ($)
Worksheet E-13, Line 3 _____

o. Survey plat - final closure cost ($)
Worksheet E-14, Line 4 _____

WORKSHEET I-1 (page 5)

p. Surface impoundment subtotal ($)
Line 5a + Line 5b + Line 5c +
Line 5d + Line 5e + Line 5f +
Line 5g + Line 5h + Line 5i +
Line 5j + Line 5k + Line 5l +
Line 5m + Line 5n + Line 5o _____

6. Land Treatment (Volume II)

a. Inventory management cost ($)
Worksheet F-1, Line 9 _____

b. Run-on/run-off management
cost ($)
Worksheet F-2, Line 7 _____

c. Part 264 groundwater monitoring
cost ($)
Worksheet F-3, Line 8 _____

d. Part 265 groundwater monitoring
cost ($)
Worksheet F-3, Line 5 _____

e. Inspection and repair cost ($)
Worksheet F-4, Line 5 _____

f. Revegetation cost ($)
Worksheet F-5, Line 7 _____

g. Repair of drainage channels
cost ($)
Worksheet F-6, Line 3 _____

h. Soil monitoring cost ($)
Worksheet F-7, Line 5 _____

i. Testing for soil contamination
cost ($)
Worksheet F-8, Line 3 _____

j. Decontamination cost ($)
Worksheet F-9, Line 13 _____

k. Removal of contaminated soil
cost ($)
Worksheet F-10, Line 8 _____

WORKSHEET I-1 (page 6)

l. Certification of partial closures cost ($)
Worksheet F-11, Line 4 _____

m. Survey plat - partial closures cost ($)
Worksneet F-12, Line 4 _____

n. Survey plat - final closure cost ($)
Worksheet F-13, Line 4 _____

o. Survey plat - final closure cost ($)
Worksheet F-14, Line 4 _____

p. Land treatment subtotal ($)
Line 6a + Line 6b + Line 6c + Line 6d + Line 6e + Line 6f + Line 6g + Line 6h + Line 6i + Line 6j + Line 6k + Line 6l + Line 6m + Line 6n + Line 6o _____

7. Landfill (Volume II)

a. Inventory management cost ($)
Worksneet G-1, Line 6 _____

b. Leachate and/or run-off management cost ($)
Worksneet G-2, Line 9 _____

c. Gas monitoring cost ($)
Worksheet G-3, Line 4 _____

d. Part 264 groundwater monitoring cost ($)
Worksheet G-4, Line 8 _____

e. Part 265 groundwater monitoring cost ($)
Worksheet G-4, Line 5 _____

f. Inspection and repairs cost ($)
Worksneet G-5, Line 4 _____

g. Testing for soil contamination cost ($)
Worksheet G-6, Line 3 _____

h. Decontamination cost ($)
worksneet G-7, Line 13 _____

WORKSHEET I-1 (Page 7)

i. Removal of contaminated soil cost ($)
Worksheet G-8, Line 8 _____

j. Final cover cost ($)
Worksheet G-9, Line 12 _____

k. Revegetation cost ($)
Worksheet G-10, Line 6 _____

l. Certification of partial closures cost ($)
Worksheet G-11, Line 3 _____

m. Survey plat - partial closures cost ($)
Worksheet G-12, Line 4 _____

n. Certification of final closure cost ($)
Worksheet G-13, Line 3 _____

o. Survey plat - final closure cost ($)
Worksheet G-14, Line 4 _____

p. Landfill subtotal ($)
Line 7a + Line 7b + Line 7c + Line 7d + Line 7e + Line 7f + Line 7g + Line 7h + Line 7i + Line 7j + Line 7k + Line 7l + Line 7m + Line 7n + Line 7o _____

8. Closure Cost Subtotal ($)
Line 1g + Line 2i + Line 3g + Line 4l + Line 5p + Line 6p + Line 7p _____

9. Cost Updating Factors
(Volume III Appendix)

a. Factor for EPA Region _____

b. Factor for updating costs to current dollars (factor > 1) _____

c. Updated cost ($)
Line 8 x Line 9a x Line 9b _____

WORKSHEET 1-1 (page 8)

10. Engineering Fee, Contractor's Overhead and Profit, and Contingency Factor (Volume III)

    a. Engineering fee (decimal < 1) _____

    b. Contractor's O & P (decimal < 1) _____

    c. Updated cost including fees ($)
    Line 9c x (1 + Line 10a) x
    (1 + Line 10b) _____

    d. Contingency (factor $\leq$ 2) _____ (typical = 0.1 to 0.25; p. 10-6)

11. Total Closure Cost ($)
    Line 10c x (1 + Line 10d) _____

WORKSHEET I-2

Post-Closure

1. Land Disposal Facilities (Volume II)

   a. Notation on property deed - partial closures cost ($)
      Worksheet H-1, Line 4 _____

   b. Notation on property deed - final closure cost ($)
      Worksheet H-2, Line 4 _____

   c. Maintenance of waste management area boundaries cost ($)
      Worksheet H-3, Line 2 _____

   d. Facility inspection cost ($)
      Worksheet H-4, Line 4 _____

   e. Routine maintenance and repairs cost ($)
      Worksheet H-5, Line 11 _____

   f. Severe erosion damage repair cost ($)
      Worksheet H-6, Line 5 _____

   g. Leachate management cost ($)
      Worksheet H-7, Line 11 _____

   h. Part 264 groundwater monitoring cost ($)
      Worksheet H-8, Line 9 _____

   i. Part 265 groundwater monitoring cost ($)
      Worksheet H-8, Line 9 _____

   j. Gas monitoring cost ($)
      Worksheet H-9, Line 4 _____

   k. Soil monitoring cost ($)
      Worksheet H-10, Line 2 _____

   l. Demonstration for exemption from post-closure activities for land treatment units cost ($)
      Worksheet H-11, Line 3 _____

   m. Certification of post-closure cost ($)
      Worksheet H-12, Line 3 _____

WORKSHEET 1-2 (page 2)

2. Post-Closure Cost Subtotal ($)
   Line 1a + Line 1b + Line 1c +
   Line 1d + Line 1e + Line 1f +
   Line 1g + Line 1h + Line 1i +
   Line 1j + Line 1k + Line 1l +
   Line 1m

3. Cost Updating Factors
   (Volume III Appendix)

   a. Factor for EPA Region _____

   b. Factor for updating costs to
      current dollars (factor > 1) _____

   c. Updated cost ($)
      Line 2 x Line 3a x Line 3b _____

4. Engineering Fee, Contractor's
   Overhead and Profit, and Contingency
   Factor (Volume III)

   a. Engineering fee (decimal < 1) _____

   b. Contractor's O & P (decimal < 1) _____

   c. Updated cost including fees ($)
      Line 3c x (1 + Line 4a) x
      (1 + Line 4b) _____

   d. Contingency (factor $\leq$ 2) _____ (typical = 0.1 to 0.15; p. 10-6)

5. Total Post-Closure
   Cost ($/yr)
   Line 5 - 30

WORKSHEET I-3

Contingent Closure

1. Treatment and Storage Tank (Volume I)

   a. Inventory management cost ($)
      Worksheet B-1, Line 9 _____

   b. Testing for soil contamination
      cost ($)
      Worksheet B-2, Line 3

   c. Decontamination cost ($)
      Worksheet B-3, Line 14 _____

   d. Foundation/pad removal cost ($)
      Worksneet B-4, Line 8 _____

   e. Tank removal cost ($)
      worksneet B-5, Line 7 _____

   f. Secondary containment system
      removal cost ($)
      worksneet B-6, Line 9 _____

   g. Removal of contaminated soil
      cost ($)
      worksheet B-7, Line 8 _____

   h. Certification of final closure
      cost ($)
      worksneet B-8, Line 3 _____

   i. Inspection and repairs cost ($)
      Worksneet B-9, Line 4 _____

   j. Final cover cost ($)
      Worksheet B-10, Line 12 _____

   k. Revegetation cost ($)
      worksheet B-11, Line 6 _____

   l. Groundwater monitoring well
      construction cost ($)
      Worksheet B-12, Line 5 _____

   m. Part 264 groundwater monitoring
      cost ($)
      Worksheet B-13, Line 5 _____

   n. Part 265 groundwater monitoring
      cost ($)
      Worksneet B-13, Line 6 _____

WORKSHEET I-3 (page 2)

o. Survey plat - final closure
Worksheet B-14, Line 4 _____

p. Treatment and storage tank subtotal ($)
Line 2a + Line 2b + Line 2c + Line 2d + Line 2e + Line 2f + Line 2g + Line 2h + Line 2i + Line 2j + Line 2k + Line 2l + Line 2m + Line 2n + Line 2o _____

2. Waste Pile (Volume II)

a. Inventory management cost ($)
Worksheet D-1, Line 6 _____

b. Leachate and/or run-off management cost ($)
Worksheet D-2, Line 9 _____

c. Part 264 groundwater monitoring cost ($)
Worksheet D-3, Line 8 _____

d. Part 265 groundwater monitoring cost ($)
Worksheet D-3, Line 5 _____

e. Testing for soil contamination cost ($)
Worksheet D-4, Line 3 _____

f. Decontamination cost ($)
Worksheet D-5, Line 13 _____

g. Foundation/pad removal cost ($)
Worksheet D-6, Line 8 _____

h. Containment/liner system removal cost ($)
Worksheet D-7, Line 8 _____

i. Removal of contaminated soil cost ($)
Worksheet D-8, Line 8 _____

j. Certification of partial closures cost ($)
Worksheet D-9, Line 3 _____

WORKSHEET 1-3 (page 3)

k. Certification of final closure cost ($)
Worksheet D-10, Line 3 _____

l. Inspection and repairs cost ($)
Worksheet D-11, Line 4 _____

m. Final cover cost ($)
Worksheet D-12, Line 12 _____

n. Revegetation cost ($)
Worksheet D-13, Line 6 _____

o. Survey plat - partial closures cost ($)
Worksheet D-14, Line 4 _____

p. Survey plat - final closure cost ($)
Worksheet D-15, Line 4 _____

q. Waste pile subtotal ($)
Line 1a + Line 1b + Line 1c + Line 1d + Line 1e + Line 1f + Line 1g + Line 1h + Line 1i + Line 1j + Line 1k + Line 1l + Line 1m + Line 1n + Line 1o + Line 1p _____

3. Surface Impoundment (Volume II)

a. Inventory management cost ($)
Worksheet E-1, Line 12 _____

b. Leachate and/or run-off management cost ($)
Worksheet E-2, Line 9 _____

c. Part 264 groundwater monitoring cost ($)
Worksheet E-3, Line 9 _____

d. Part 265 groundwater monitoring cost ($)
Worksheet E-3, Line 5 _____

e. Inspection and repairs cost ($)
Worksheet E-4, Line 4 _____

f. Testing for soil contamination cost ($)
Worksheet E-5, Line 3 _____

WORKSHEET I-3 (page 4)

g. Decontamination cost ($)
Worksheet E-6, Line 10 _____

h. Removal of contaminated soil
cost ($)
Worksheet E-7, Line 8 _____

i. Final cover cost ($)
Worksheet E-9, Line 12 _____

j. Revegetation cost ($)
Worksheet E-10, Line 6 _____

k. Certification of partial closures
cost ($)
Worksneet E-11, Line 3 _____

l. Survey plat - partial closures
cost ($)
worksneet E-12, Line 4 _____

m. Certification of final closure
cost ($)
worksneet E-13, Line 3 _____

n. Survey plat - final closure
cost ($)
worksneet E-14, Line 4 _____

o. Surface impoundment subtotal ($)
Line 2a + Line 2b + Line 2c +
Line 2d + Line 2e + Line 2f +
Line 2g + Line 2h + Line 2i +
Line 2j + Line 2k + Line 2l +
Line 2m + Line 2n _____

4. Contingent Closure Cost Subtotal ($)
Line 1b + Line 2q + Line 3o _____

5. Cost Updating Factors
(Volume III Appendix)

a. Factor for EPA Region _____

b. Factor for updating costs to
current dollars (factor > 1) _____

c. Updated cost ($)
Line 3 x Line 4a x Line 4b

WORKSHEET I-3 (page 5)

6. Engineering Fee, Contractor's Overhead and Profit, and Contingency Factor (Volume III)

   a. Engineering fee (decimal < 1) _____

   b. Contractor's O & P (decimal < 1) _____

   c. Updated cost including fees ($)
      Line 5c x (1 + Line 6a) x
      (1 + Line 6b) _____

   d. Contingency (factor ≤ 2) _____ (typical = 0.1 to 0.25; p. 10-6)

7. Total Contingent Closure Cost ($)
   Line 6c x (1 + Line 6d) _____

WORKSHEET I-4

Contingent Post-Closure

1. Land Disposal Facilities (Volume III) (inlcudes tank facilities closed as landfills)

   a. Notation on property deed - partial closures cost ($)
      Worksheet H-1, Line 4 _____

   b. Notation on property deed - final closure cost ($)
      Worksheet H-2, Line 4 _____

   c. Maintenance of waste management area boundaries cost ($)
      Worksheet H-3, Line 2 _____

   d. Facility inspection cost ($)
      Worksheet H-4, Line 4 _____

   e. Routine maintenance and repairs cost ($)
      Worksheet H-5, Line 11 _____

   f. Severe erosion damage repair cost ($)
      Worksheet H-6, Line 5 _____

   g. Leachate management cost ($)
      Worksheet H-7, Line 11 _____

   h. Part 264 groundwater monitoring cost ($)
      Worksheet H-8, Line 9 _____

   i. Part 265 groundwater monitoring cost ($)
      Worksheet H-8, Line 9 _____

   j. Certification of post-closure cost ($)
      Worksheet H-12, Line 3 _____

2. Contingent Post-Closure Cost Subtotal ($)
   Line 1a + Line 1b + Line 1c + Line 1d + Line 1e + Line 1f + Line 1g + Line 1h + Line 1i + Line 1j _____

WORKSHEET 1-4 (page 2)

3. Cost Updating Factors
(Volume III Appendix)

   a. Factor for EPA Region _____

   b. Factor for updating costs to current dollars (factor > 1) _____

   c. Updated cost ($)
   Line 2 x Line 3a x Line 3b _____

4. Engineering Fee, Contractor's Overhead and Profit, and Contingency Factor (Volume III)

   a. Engineering fee (decimal < 1) _____

   b. Contractor's O & P (decimal < 1) _____

   c. Updated cost including fees ($)
   Line 3c x (1 + Line 4a) x (1 + Line 4b) _____

   d. Contingency (factor ≤ 2) _____ (typical = 0.1 to 0.15; p. 10-6)

5. Total Contingent Post-Closure Cost ($)
Line 4c x (1 + Line 4d) _____

6. Annual Contingent Post-Closure Cost ($/yr)
Line 5 ÷ 30 _____